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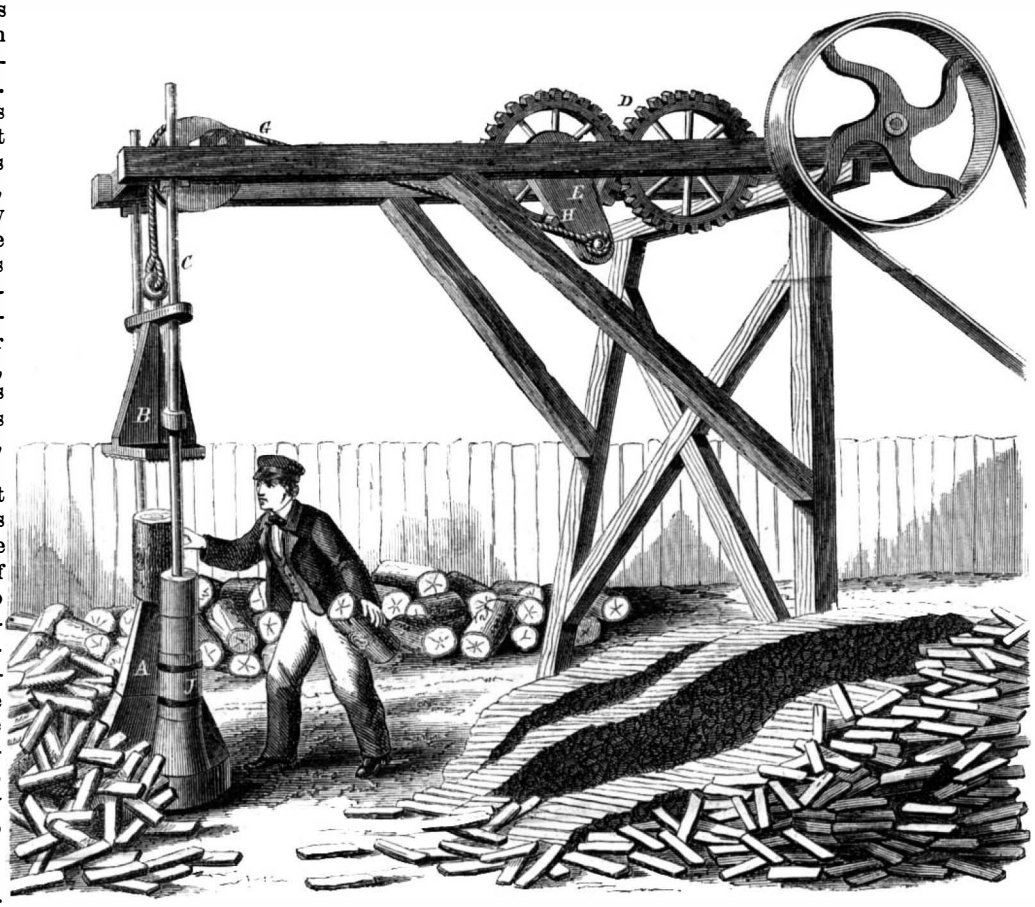
Wood-splitting Machine.

This machine is intended to be used where large quantities of wood have to be split, as in factories, where it is prepared for kindlings; railroad stations, and similar places. It is simple in construction and very efficient; it is also powerful, for the most obstinate, knotty, or crooked-grained block, can be cloven with ease by it. The machine is simply a cast-iron block, A, solidly placed, with a heavy hammer, B, to which the knives or axes, are secured. This hammer slides between the rods, C, and is elevated by the gearing, D. The shaft the crank, E, is on, is carried in stout bearings; the rope, G, is attached to the crank, which is carried around by a pin, H, in one of the wheel arms; so soon as the crank reaches a vertical position it falls forward and the hammer descends on the wood, cleaving it asunder. This operation is repeated as long as the pulley, I, drives the gearing.

There are springs, J, at the bottom of the slides which support the knife hammer, and keep it off of the splitting block, so that the machine may continue to run while the attendant is absent or adusting the block to be split, without injuring the cutting edges. The inventor says that he lately split a full cord of hard, dry oak-wood, sawed in two and three cuts, in twenty-six minutes, and that one machine has been running for five months at a cost of less than $1 for repair. It will split from 15 to 18 cords of wood a day, including knotty pieces, and the labor of two boys is all that is required to operate it. It was patented through the Scientific American Patent Agency on the 17th of May, 1864, by John A. Knight, of St. Louis, Mo.; for further particulars address Kingslands & Ferguson, St. Louis, Mo.



KNIGHT'S WOOD-SPLITTING MACHINE.

Altering Light Draft Monitors.

The United States Gazette says, "The condemned monitor Tunxis will, after all, prove a valuable ship. She is now hauled out, and the defects in her construction are all in course of remedy. It was a Titanic task—this hauling from the water a huge iron-clad of sixteen hundred tons weight. To perform it required a great deal of mechanical skill. Three hundred and twenty-five men, with five 'crabs,' performed the work, which was accomplished up 'ways' inclined an inch to a foot, and without an accident of any kind. It is the first time in this country that such a feat has been performed, upon greased 'ways,' and Philadelphia has another feather in its cap in consequence.

"The alterations are important. The solid decks are being taken off and the hull raised twenty-two inches. The former will then be replaced. In her previous condition the Tunxis drew so much water as to render her valueless. In three months she will be again afloat, and a match for the Yazoo, which is also being altered at the same yard. The Yazoo was another failure. Of the twenty light draft monitors ordered by the government the same mistakes in construction were made. Some of them have been altered into torpedo boats, with one 8-inch gun on their bows. The Napa, the first to be so metamorphosed, is now at the Navy-yard, just finished. The Yazoo and Tunxis will be as valuable when finished as the government expected them to be when first ordered. The builders will alter the rest of them at their own expense."

It strikes us that two portable engines on the ground would have been quite as efficient and much more expeditious than 325 men.

Pneumatic Dispatch and Telegraphy.

Recently a pneumatic dispatch apparatus was tried in Manchester in connection with telegraphy. Owing to the increase of their business in Manchester, the Electric and International Telegraph Company has lately taken extensive premises in York street, and opened a central station there. In order to facilitate the rapid dispatch of messages from the branch offices at Ducie Buildings (Royal Exchange) and No. 1 Mosley street, it has been deemed advisable to connect these offices with the central station by means of the pneumatic system, the same as is adopted by the company in London and Liverpool. Between the branch offices above mentioned and the central station leaden pipes with an inside diameter of 1½ inches have been laid down under the streets. The leaden pipes are made perfectly air tight, and are inclosed in 2-inch iron pipes, to protect them from being damaged. At the central station there is fixed in the basement a small high-pressure beam engine, and connected with it a double-action air pump, 17 inches in diameter and 15-inch stroke. The pump is continually at work exhausting the air from a cylinder 8 feet long and 4 feet in diameter, which is styled the vacuum cylinder. The pipes which pass under the streets from the branch offices are terminated in the instrument room on the top floor of the building, and the pipes from the vacuum cylinder are also carried to the same place, and they can be put in connection by simply opening a valve. The carriers which travel through the pipes are made of gutta percha covered with felt. They are about five inches long, and of a diameter nearly equal to that of the pipe. They are hollow inside for the purpose of containing the messages. Electric bells are employed to give the necessary signals for the working of the pipes.—When the officials at the Ducie Buildings office wish to send a "carrier" they place one in the mouth of the pipe and signal the central station by ringing its bell. The clerk in attendance at the latter place by moving a small lever, puts the pipe in communication with the vacuum cylinder. The air in the pipe then rushes into the vacuum cylinder, and the "carrier," having the ordinary atmospheric pressure behind it, is propelled through at a speed of from 35 to 40 miles an hour. On the arrival of the "carrier" at the central station it strikes against a spring buffer, which, by a simple, self-acting contrivance, cuts off the communication between the pipe and the vacuum cylinder, and the "carrier" falls from the valve on to a counter prepared to receive it. To send a "carrier" from the Mosley-street office the action is precisely the same. By using a second chamber, and compressing air into it, a force is obtained for blowing the "carriers" from the central station to the branch offices, so that the pipes can be made available for carrying in both directions. The branch office in Mosley street is about 320 yards from the central office, and the distance of the Ducie Buildings from the branch office is 510 yards. The time occupied by a "carrier" in traversing the shorter distance is 22 seconds.—*Engineer.*

THE TIDE of travel to the oil regions of Pennsylvania is swelling all the time. The cars going in that direction are crowded to their utmost capacity, and at Titusville the hotel accommodations, although largely increased recently, are still inadequate.

THE address of Mr. Porter, the inventor of the sifter shovel, illustrated on page 14, of the present number, is 415, Hudson St., not 15 as given.

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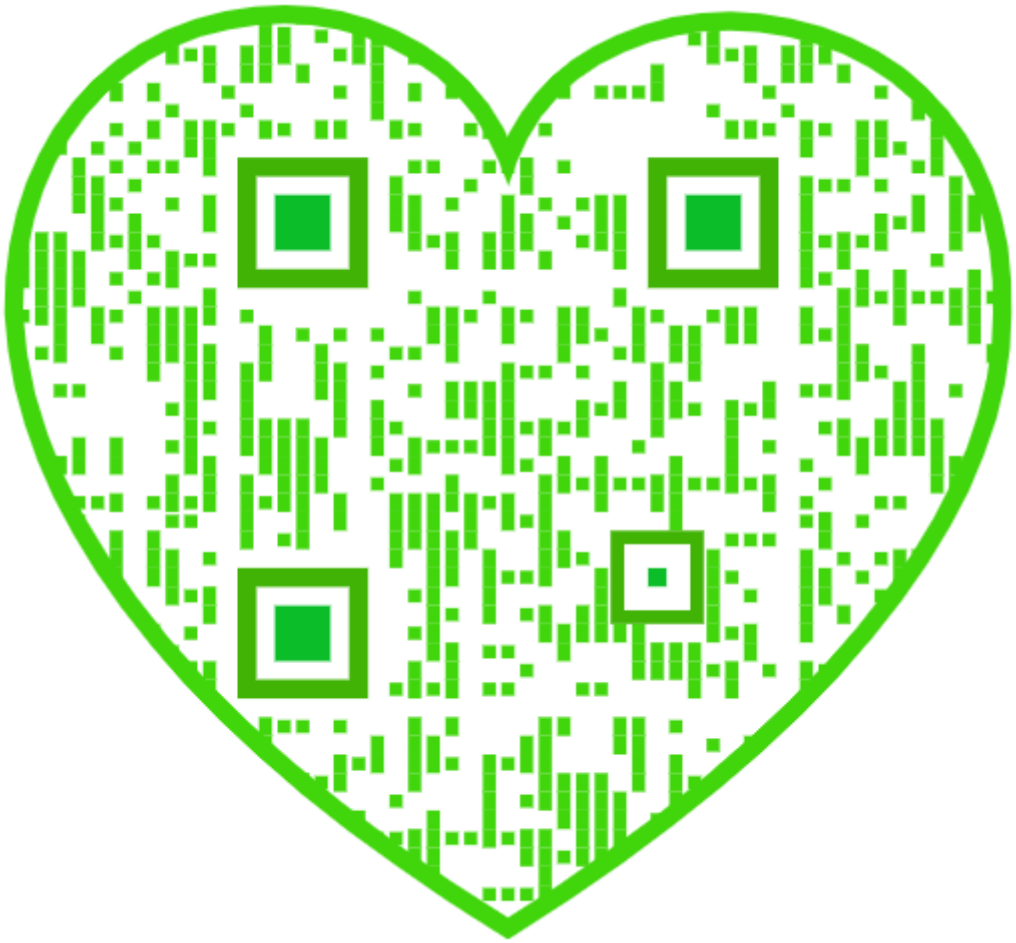

A VISIT TO SOME ENGLISH WIRE WORKS.

One ot the most striking characteristics of the progress of manufacturing industry in the present age is the continual application of old materials to new uses. In some instances, such as the employment of iron in one form or other in almost every branch of art or manufacture, the reason is to be sought for in the great improvements that have taken place in the production of this metal from the raw material, and the comparative cheapness and ease with which it is worked into innumerable forms.

India-rubber may be taken as another example. Barely thirty years ago, it was only used for effacing pencil-marks in drawings; now it would indeed be difficult to say to what use it has not been applied.

But there are also many cases in which manufacturers of a dull, plodding disposition have put the same material to the same use for any number of years, without ever dreaming of putting it to any other, until some younger partner of the firm, or possibly a foreman with more than the usual allowance of brains, suddenly employs the material in a fresh direction, and forthwith every one in the trade follows suit, and the use of the substance is gradually developed.

A few years ago wire was applied to comparatively few uses. Wire fencing was unheard of; wire blinds were only just coming into use; wire flower-stands were seen only here and there; and had any one proposed wire garden-seats and tables, they would have been laughed at as lunatics, Now the case is different; the bedroom, the drawing-room, the parlor, the kitchen, the garden, and the farmyard, are all full of articles, elegant or useful, entirely made of wire.

It was with. the notion of giving our readers an idea of the method of making some few at least of the innumerable articles made of wire and sold by them that we requested Messrs. Hawkins, of Dale End, Birmingham, to allow us to inspect their extensive works—a request that was acceded to by them in the most courteous manner.

Mr. Hawkins first conducts us into the wire-weaving shops, where we find about twenty stalwart weavers busily engaged in converting iron, copper, and brass wire into fabrics of different degrees of fineness. Some of these are very coarse, containing, perhaps, four wires one-eighth of an inch thick to the inch. Others, again, are very fine, such as the wire gauze used by chemists and druggists for sifting powders. One piece we were shown, made of brass wire, had as many as 120 meshes to the inch, and consequently contained no less than 14,400 holes in a square inch of surface.

The process of wire-weaving is precisely similar to that of weaving any other plain fabric; it will not, therefore, be necessary to describe it in detail. The material being so much heavier, the looms, of course, are made proportionally stronger; some of them—those for weaving coarse wire for kiln floors, for instance—being built of cast-iron, and requiring three or four strong men to work them. The weaving of the coarser kinds is no easy work, a pair of strong arms being required to give the repeated blows necessary to bring the weft home to its proper place. In some sorts, when the wires are far apart, a very correct eye is requisite, as the distance between the wires is regulated entirely by the strength of the blow given to the weft.

The woven wire is applied to an almost infinite number of purposes, some of which we shall describe.

From the weaving room we pass into another, in which the process of sieve-making is being carried on. Some of these are made by stretching wires alternately across the circular hoop forming the sieve, others are made in the shape of a spider's web, while the finer kinds are made of the course or fine wire gauze, woven in lengths. These are made very simply. A circular piece of gauze rather larger than the sieve is cut out, and placed over a hoop. Another hoop, slightly larger, is then pressed over this a quarter or half an inch, and the whole is secured by rivets. These sieves, which are of all sizes, are used for sifting grain and seeds, powders for chemists and druggists, dyers, &c., and also for culinary purposes. For this latter use the wire is slightly tinned, in order to avoid all chance of the brass giving a taste to the soup or other liquid strained through it. The corners of gauze cut off are all preserved, being useful in covering gas-burners, eye-shades, &c., &c.

In one corner of this shop a man is making S hooks in a very simple manner. A long spiral is first formed by winding a wire round a mandril. This spiral is then cut at every other turn, forming pieces containing two rings; the two rings are then opened out into a figure of 8, and the two circles slightly opened. In this way common dog chains are most expeditiously made, the links being put together by children.

Passing farther on, we come to a shop where there are a number of men making fire-guards of different patterns. The numerous fatal accidents that have occurred during the last three or four years, have led to a great demand for these adjuncts to the fireside. The common wire-net guards are very simply made. A piece of net cut square at the bottom, with a circular top, is laid in hollow semi-dome-shaped mould, a corresponding piece being let down upon it. While it is held in this shape, the wires projecting round the edges are bent round a piece of stiff wire of the proper shape, which retains it in its form when relieved from the mold. The hooks by which it hangs on the grate are then fastened on, and the whole thing is complete. So quickly and easily are these made, that Messrs. Hawkins can supply them at a rate so low as to allow the retailer to sell them at 1s. 9d. and 2s.

Passing farther on, several men are at work on a very different class of article. We allude to the elegant brass wire guards for the drawing-room. These have now become really works of art, and require workmen having some artistic knowledge for this manufacture. The design is first cut upon a board. The outline is then formed in wire and fixed over the design with a few hooks, the details being cut and filled in with great skill and care. In fact, the worker makes a wire tracing, as it were, of the design upon the board.

Stepping across the yard, we enter another building, where women are busily weaving the hexagonal netting now so common. The wires are held on bobbins, and the meshes are formed by enclosing a hexagonal shape with each pair of wires. Large quantities of this are now used for fencing, being strong, light, and cheap. In fact, the demand for it has been so great, that Messrs. Hawkins have been obliged to invent a machine for manufacturing it.

The next shop we visit is that devoted to making corrugated netting—that is to say, open netting, in which the wires are kept in their places by regular depressions and elevations. The wire is first prepared in lengths by being pressed through a pair of toothed rollers. The wires are then threaded together diagonally by children on a large flat table, the distance of the corrugations giving the size of the meshes. It is a pretty sight to see the wonderful activity with which the little fingers work the wires into their places. By missing a wire at certain intervals, a pattern may be formed in this description of net, which is much used for ornamental fire-guards.

We were then shown the way in which meat covers are made. The wire gauze is first cut to an oval shape, after which it is laid upon a hollow mold, a little shallower than the intended cover. It is gently squeezed into this by a corresponding shape, a piece being left all round. Over this is soldered a double tin ring, which retains the gauze in proper shape when released from the mold. Visors for fencing are made in the same way, only the wire is of course much stronger than that intended merely for keeping the flies away from cold roast lamb.

California Raisins.

The California *Farmer* says: The curing of the grape, the making of raisins, is destined, in coming years, to become a great branch of trade. Several parties have made more or less raisins the past two years, and have shown them at our fairs, and the raisins thus made have been found to be superior to those imported, being fresher and containing the full rich flavor of the grape which is almost all lost by long voyages of importation.

H. M. Bugbey, Esq., has been very successful in making raisins. The process of curing adopted by Mr. Bugbey is as follows: He makes a frame work, near the vineyard, over which he places laths, making a wicker work frame, on this he lays straw paper. The grapes must be thoroughly ripe, they are gathered and laid on this paper, in ten days they are turned over, they will then flatten and the work is done. The frames are protected from birds, bees, etc., by musketo bars. After they are thus cured they are packed in large boxes between layers of paper for a brief time, then finally packed and sent to market. Mr. Bugbey made 1,000 pounds in 1863, and will cure 5,000 pounds the present year, he also made 6,000 gallons wine.

The vineyards of Mr. B. are the Natoma Vineyard which has 32,000 vines, and the Duroc Vineyard, of 17,000 vines. These raisins are much superior to imported fruit, and we can always have them 4 to 6 months earlier than any can be imported. This is a branch of business that should be encouraged.

Deposition of Scale in Marine Boilers.

In an interesting discussion on this subject, before the Institute of Scottish Engineers, the following information was elicited:—

"Mr. Elder said he had a good deal to do with the working of boilers at from 30 lbs. to 35 lbs. pressure without surface condensers, and in some cases he had seen very extraordinary deposits. One naturally expected to find most deposit in the section of a boiler where there was most salt and lime; but in a boiler divided into eighteen parts he had found, to his surprise, that although in the last section there were two and a half times more salt in the water than in that of the first section, yet he could ascertain little difference in the quantity of deposit of lime in any section. He had therefore come to the same conclusion as the President, that the deposit depended upon the temperature of the water, and not upon the quantity of lime in it. The great difficulty they had to contend with in preventing deposit, was that of keeping the circulation in such a state as that the currents would prevent the deposit, for it was found that where there was a current in a boiler the lime did not deposit to any extent. There was certainly no evidence to show that the lime deposited more on account of the presence of a greater quantity of it. The Americans ran with a pressure of 40 lbs. at sea, and they did not appear to suffer much from deposit. They seemed to overcome the deposit of lime by cleaning the boiler whenever they got into port. He was aware of boilers working at 30 lbs. for six or seven years, and the deposit was not greater with that than at lower pressures. He was quite satisfied, with the President, that the lime deposited with pure sea water, and with sea water having twice or thrice the usual quantity of salt in it, was the same.

"Mr. Lawrie remarked that apparently it was Mr. Napier's opinion that beyond a certain pressure the deposit of sulphate of lime was not aggravated by an increased pressure.

"Mr. Elder observed that, though the lime separated from the water, yet it did not necessarily settle down unless it got into eddies. Where the heating surface was, it had no great tendency to deposit. It was found that the deposit occurred in places where there was no great current.

"Mr. Lawrie said that they would naturally expect to find it down below the furnace. He asked whether it had been found in practice that there was a greater or less deposit in boilers working at 60 lbs. pressure than at 30 lbs.? He would infer from the discussion that the deposit of the sulphate of lime was not greater at the higher pressure.

"Mr. Elder had observed boilers working with salt water for three or four months at 45 lbs. pressure, and he could not say there was much difference between the deposit at that pressure and at 25 lbs. He believed, however, there was a greater tendency for the lime to separate from the water, but it did not necessarily settle down over the heating surface of the boiler

"Mr. Lawrie said that the gunboats, of which the late Mr. Hughes had great experience, worked at a pressure of 60 lbs., and no extreme difficulties have been experienced in them.

"Professor Thomson suggested that the water might be filtered in a tube 10 or 12 feet long, in which it could be heated up to 150 deg. Cent., but this would probably take a good deal of power.

"Mr. Elder remarked that nearly every engineer

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knew of examples of furnace crowns and furnace sides of steam boilers with salt water tumbling in on account of the deposit of lime or salt on those parts; and it was always considered to be the result of too little blowing off, any such accident being prevented by sufficient blowing off. Were there not other deposits formed at a greater degree of saturation? Suppose they had a quadruple strength of salt in the boiler, was the salt deposited of an injurious kind when it got to a certain density? When did the injurious deposit begin? He believed that when water got to those densities, the lime and the salt formed a crust, and became a non-conductor, and the surface got nearly red-hot, and tumbled in. Now, if the lime came out at a temperature of 220 deg., one would suppose that it would do the same at 230 deg. or 240 deg.

"Mr. James R. Napier answered that the sides of most furnaces bulged between the stays, but he did not know the cause of it.

"Mr. Lawrie remarked that there seemed to be one very important fact ascertained—that the extensive use of refrigerators could not be attended with the good that was expected from them.

"Mr. Elder had observed that the regenerators in the *Shamrock* and *Thistle* wore away rapidly at the ends of the tubes, which were of brass, where the current of water impinged against them, which he believed arose from the mechanical friction caused by the velocity of the water. He would have expected that iron tubes would have gone much more quickly; for in the cases he had mentioned there was no appearance of galvanic action.

"Mr. Lawrie said the old refrigerators did not wear away quickly, although the water struck against their brass ends.

"Mr. Thomas Russell had seen regenerator tubes worn away both from mechanical action and other causes, such as by rust; whilst he also knew that they worked about ten years in the West India boats, and yet seemed pretty perfect after that, and certainly not worn out: so much so, that when they got new boilers, they repaired their regenerators, and continued to work them for years after that. He did not know whether they were still working them."

NEW BOOKS AND PUBLICATIONS.

JOHN GODFREY'S FORTUNES. Bayard Taylor. Hurd & Houghton, publishers, New York.

There are few forms of human experience that have more interest in narration than the joys and sorrows of literary life. "John Godfrey's Fortunes" is such a narrative, and in its pages those who have never trod the steeps which lead to fame, may read the trials and temptations which beset men of this profession. The author in his preface disclaims any intention of identifying himself with the hero of the book, but it is manifest that he has passed through similar scenes and given the reader the benefit of his experience.

Regarding the work itself, no better picture of American social life, in some of its humbler phases, has appeared for many a day, and the style is easy, connected, and flowing throughout.

Deep down in the heart of the hottest pursuer after gold there is a corner which holds a remembrance of earlier days, and brighter scenes than the temples of money changers present. The plow in the newly turned furrow, the bobolink balancing on the clover tops, the cattle on a thousand hills, the birch stems that were gnawed, and the wintergreens that were plucked, are unforgotten memories of the past. Conjoined with these are the hopes of youth and the trust and faith in the general goodness of mankind. The rush and jostling of the throng cover these memories up, and cares grow over and bury them, until some such book as "John Godfrey's Fortunes" unlocks the chamber where they sleep and wakes them into life. One renews his youth, and forgets the sarcasm, the cynicism, or worse, which surrounds him, and is the better, therefore, in reading this simple story, told in an unostentatious manner. No better book for a holiday present could be given, and we trust that it will find ready sale.

ELIANA. Charles Lamb. Hurd & Houghton, New York.

"The king's chaff is as good as other people's corn," says the motto on the title page of this work; a palpable apology for the poverty of the contents. It is very questionable taste to delve among the literary rags and tatters of great authors and exhume productions which in their own wisdom they refrained from giving to the public while living. Great writers have their moments of weakness, their periods when the muse, or the brain, is *en dishabille*; why shall these be revealed in all their nakedness to public gaze? Why shall we give unimpeachable evidence to the public that Charles Lamb could write platitudes as well as the most hackneyed penny-a-liner? This is what "Eliana" does, and if the gentle writer were alive he would not have suffered it to appear.

A common place by Charles Lamb falls as dull and cold upon the ear as one by John Smith, and the king's chaff is just as bitter to the tongue as the husks the swine did eat. "The Pawnbroker's Daughter" is the veriest balderdash that ever was written, and the only thing in "Eliana" that bears the imprint of the beautiful genius of Charles Lamb, is "the adventures of Ulysses." In this olden fragment of Grecian mythology there is some trace of the gentle fancy of the author of "an essay on roast pig."

Let us have posthumous works that keep our favorites clothed and in their right mind, but let no man throw a stone upon their monuments that disgraces them. Let us not rake up from oblivion all their weaknesses, so that the critic can shake his locks at them and say, "thou, too, hast written trash."

OUR FARM OF FOUR ACRES. James Miller, Publisher, 522 Broadway, New York.

The value of practical information on any useful subject is well shown by the popularity of this little work. It has run through twelve editions, and a demand still exists. In its pages the experience of two ladies with a farm of four acres is detailed at length, and the several delays, losses, incidents and accidents in making butter, curing pork, keeping poultry and pigs, are narrated in a lively style and lucid manner. Indeed, the book derives no small value, apart from the experiences set forth, from the very absence of pretension to literary display. Many of our readers who reside in the country own small places, and they can learn a great deal from this little book which will prove a lasting benefit.

HAND-BOOK OF HYGIENIC PRACTICE. R. T. Trall. Miller & Wood, 15 Laight street, New York.

Those who believe cold water to be a specific for every ailment human flesh is heir to, and find more virtue in bran bread and coarse food of a farinaceous character, than in the goods the gods provide, will be interested in this work. In the front part is a compendious account of how delicious puddings, pies, bread, etc., can be made from indian-meal, brown flour, and similar substances. The directions for applying cold water as a curative are very full,, and the book will no doubt have a good circulation.

Dog Fish for Fuel.

At a meeting of the Natural History Society on Wednesday evening last, an interesting account was given of the dog fish, one of the lesser sharks, its habits and the method of taking and curing it for the oil it contains. One curious fact about the species is that the flesh is also filled with oil, so that it is often dried and used for fuel, making a quick, lively blaze. The oil brings quite a high price in the market, and is an excellent lubricator. An account was also given of an efficient method of driving rats away from ships and dwelling houses, by means of chloride of lime, sprinkled around freely, taking care to allow them a means of escape. The effect is, that in a few days they will all seek pleasanter quarters. This was thoroughly tried in a ship, placing planks from one deck to another, by which means they all made their escape, and the dangerous and troublesome remedy of smoking the vessel was avoided. The meetings of the society in their new building on Berkeley street are quite well attended and full of interest.

Detecting Nitro-Benzol in Oil of Bitter Almonds.

This test consists in acting on the adulterated oil with sodium in the presence of alcohol. This metal, in contact with pure oil of bitter almonds, disengages gas, which is augmented by the addition of alcohol, and white flocks are formed. Nitro-benzol, under the same circumstances with alcohol, becomes deep brown or black and viscid. In testing the adulterated oil, take ten or fifteen drops of it, add four or five drops of alcohol and a fragment of sodium; a brown deposit, approaching black, in proportion as the nitro-benzol is in excess, occurs. The reaction is instantaneous, and when the oil contains from 30 to 50 per cent. of nitro-benzol one minute is sufficient to obtain a thick, brown liquid.

MARKET FOR THE MONTH.

By the list of prices below it will be seen that the market for the last month has experienced no very great change, excepting the remarkable advance in beef. The prices of all imported articles, of course fluctuate with the currency, as they must be paid for in gold. For instance, the price of lead is very steady at 7 cents per pound, in gold, but on some days it can be bought for a cent per pound less in the afternoon than in the forenoon, owing to the decline in gold.

	Price Nov. 30.	Price Dec. 29.
Coal (Anth.) ℔ 2,000 lb	$9 00@10 50	$9 50 @10 50
Coffee (Java) ℔ lb	50	48½@ 50
Copper (Am. Ingot) ℔ lb	48@ 49	48½@ 49
Cotton (middling) ℔ lb	1 29 @ 1 30	1 14 @ 1 15
Flour (State) ℔ bbl	$9 65@10 25	$9 45 @10 25
Wheat ℔ bush	$2 50@ 2 80	$2 12 @ 2 80
Hay ℔ 100 lb	1 45	$1 50 @ 1 65
Hemp (Am. drs'd) ℔ tun	320 00 @350 00	$340 00@400 00
Hides (city slaughter) ℔ lb	13½@ 14	13 @ 13¼
India rubber ℔ lb	70 @ 1 15	70 @ 1 20
Lead (Am.) ℔ 100 lb	$15 50 @16 00	15 00
Nails ℔ 100 lb	$9 00 @10 00	8 50 @ 9 00
Petroleum (crude) ℔ gal	48	50½@ 51
Beef (mess) ℔ bbl	$7 00 @12 00	19 00 @24 00
Saltpeter ℔ lb	30	30
Steel (Am. cast) ℔ lb	30 @ 34	19 @ 34
Sugar (brown) ℔ lb	16½@ 22¼	16½@ 25
Wool (American Saxony fleece) ℔ lb	90 @ 1 10	90 @ 1 10
Zinc ℔ lb	19 @ 20	19
Gold	2 30	2 24

Beet Sugar in Germany.

How greatly the important manufacture of beet root sugar continues to prosper in the States of the Zollverein may be judged by the following figures, condensed from a recent official report:—In 1863 there were about 250 factories in operation, which used up more than 36,000,000 cwts. of beet root. Twenty years ago only 5,000,000 cwts. of beet root were worked up into sugar. Then 18 cwts. of beet root were required to produce one cwt. of sugar; now only 12 cwts. are needed. The duty levied produced $9,000,000. The enormous profit derived from the cultivation is well known. In Austria alone 18,500,000 cwts. are grown, and 14,500,000 cwts. are worked up by 125 factories; and 32 of those each use above 140,000 cwts. of roots annually, one using as much as 408,000 cwts.

Great Deposit of Lead Slag in Greece.

At the Imperial Geological Institute of Vienna meeting, on Aug. 16, Baron von Hingenau stated that at the lead mines of Laurion, in Attica, worked for many centuries, but now abandoned, there is an accumulation of slag estimated at about 2,000,000 tuns, which, according to assays made at Marseilles, produces, on an average, from 6 to 10 kilos. of lead and three grammes of silver per 100 kilos., equals from 6 to 10 per cent. of lead, containing from 6 to 9½ ounces of silver per tun. A French company has undertaken the working of this slag, paying about £1,800 pounds to the Greek Government, and an annual rent of about £75 to the owners of the ground. Buildings, furnaces, engines, etc., have been erected for metallurgical operations, at a cost of 500,000 francs (£20,000).

The Parrott Guns and the Monitors in Porter's Expedition.

In the bombardment of Fort Fisher by Admiral Porter's fleet, six of the 100-pounder Parrott guns exploded, killing and wounding 45 of our men. Of the monitors, the Admiral says:—"On the 20th a heavy gale set in from the southwest, and, not being able to make a port without scattering all the vessels, I determined to ride it out, which I did without accident of any kind, except the loss of a few anchors, the monitors all behaving beautifully."

"The firing of the monitors was excellent, and where their shells struck great damage was done, and the little gunboats which covered them kept up a fire sufficient to disconcert the enemy's aim.

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SUGAR-MAKING IN CUBA.

At the last meeting of the Polytechnic Association, Mr. Brewster, who had been engaged for several years in manufacturing sugar on the island of Cuba, gave an interesting description of the process.

THE CANE.

There are two kinds of cane, the sweet and the crystaline. The sweet contains the most juice and the crystaline the most sugar. The cutting commences about this time of year. There is a dry season in Cuba of two or three months, beginning about the first of January, and if this dry season did not occur sugar could not be made on a large scale. However perfect the cane may be, if two or three rains fall upon it the sugar all goes down into the roots, and the cane must be left over till the next season. After the cane is cut the roots remain alive, and throw up sprouts the next year, so that the planting has to be done only once in several years. Some fields are planted once in three or four years, but the average is about once in seven years. I have been in a field that had not been planted in 28 years, and the canes were an inch and a half in diameter and 20 feet high.

THE MILLS.

The juice is expressed by passing the cane between iron rollers driven by steam engines. Three rollers are employed, making two spaces through which the cane passes; the first of these spaces is about $\frac{5}{8}$ths of an inch in thickness, while the second is not thicker than a case knife. In the large mills the rollers are some 6 feet in length; the longest that I ever saw were 7 feet, 6 inches. A trough, of a width equal to the length of the rollers, extends back from the mill 100 feet, and into this the cane is thrown to the depth of about 8 inches by a gang of negroes standing along on each side. The mill takes out from 75 to 85 per cent of the weight of the cane; the juice running off in quite a brook. The woody matter remaining, the begasse, as it is called, is used after being dried in the sun as fuel for driving the engine. Some of the sugar mills in Cuba have cost $250,000 each.

THE BOILING.

Four boilers are used for evaporating the water from sugar. The first holds 600 gallons, the second 400, and the other two 300 gallons each. As the juice is boiled down, a scum rises on the surface, and is skimmed off. After the liquor reaches a certain density, as measured by a saccharometer, it is dipped out by ladles into the next boiler, where the process is repeated. In the last boiler it is concentrated to the granulating point.

THE GRANULATING.

When properly condensed the sirup is poured into conical molds, similar to those used in the refineries of this city, only larger. The molasses drains out at the bottom of the mold, leaving the sugar. It is customary to cover the sugar in the molds with a layer of moist clay, the weight of which aids in forcing out the molasses and purifying the sugar.

THE PRODUCT.

Many estates in Cuba now turn out an article of really refined sugar, the mills being supplied with everything to be found in a New York refinery.

MAKING SUGAR FROM MOLASSES.

Dr. Rich :—I am told that a good deal of sugar is now made in this city from molasses. The molasses yields some 30 or 40 per cent of a second quality sugar, leaving a very inferior quality of molasses.

CENTRIFUGAL EXTRACTERS.

Dr. Rowell:—In some of the refineries the molasses is separated from the sugar by centrifugal force. A drum, the periphery of which is formed of fine wire cloth, is caused to rotate with great velocity, and on placing the concentrated sirup in this drum, the molasses is thrown out through the meshes of the cloth, while the sugar is retained within the drum.

Mr. Brewster:—These machines are in general use, both in our city refineries and on the Cuba plantations. It is the common method of removing the molasses. Some of the large mills have a dozen centrifugals. I have seen one that would hold 600 pounds of sugar, and the molasses was completely removed from this mass in fifteen minutes.

A VEIN of lead was recently discovered near Mineral Point, Wis., which in ten days yielded from eight to ten loads of lead.

TURNING TOOLS.

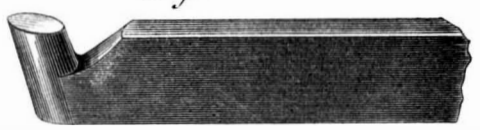
PART SECOND.

The best tools in the world, in the hands of a careless or indifferent person, are misapplied. Now, having obtained the proper tool, illustrated on page 3, current volume of SCIENTIFIC AMERICAN, let us see what is required of it.

In roughing off a shaft of any considerable size there is hard work to be done; and, to economize power, everything depends upon the shape and direction of the cutting edge. It will be conceded that to reduce the shaft with little labor to the lathe, and the least consumption of power, great surface in the cut must be avoided; that is, great surface considered in the direction of the length of the shaft. Of course in reducing the diameter of a shaft a given amount, the depth of the cut is arbitrary and depends wholly upon the amount the work is reduced.

It is manifest that the round-nosed tool, here shown, which many mechanics use, is the worst that

Fig. 9



could be employed, for the surface of the cut taken by it compared to that taken by the roughing tool shown on page 3, is as the difference between a curve and a straight line. The round-nose tool takes a cut over one-fourth of its diameter, and that portion of the surface is engaged; the shaft is not reduced in diameter, however. any more than by the diamond point tool, which cuts only on a small part of its edge, and works more directly to the end desired. The chips which are thrown off by these two tools show conclusively that one works harder than the other. One is long and free, and looks as if it were easily separated, while the other is compressed, short and crooked, and its tensile strength much less.

Fig. 10.

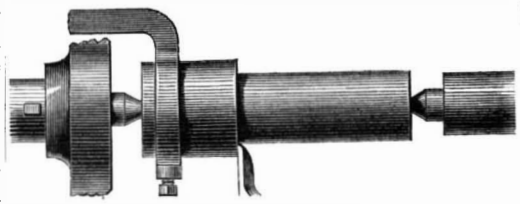


Fig. 11.

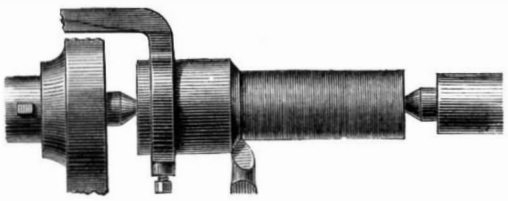
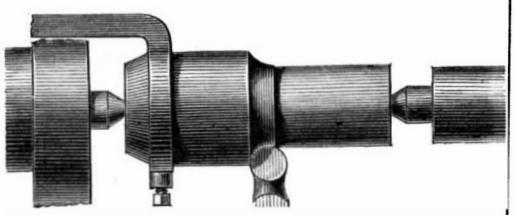


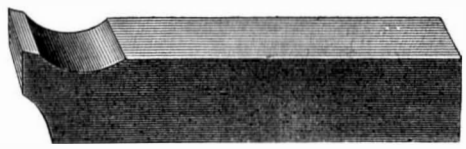
Fig. 12.



These several figures present the idea clearly. The side tool, Fig. 10, takes even less surface on the cut, in proportion to the iron removed, than a diamond point tool, Fig. 11; but it is not an economical instrument to use for roughing off work, because it soon gets dull and the point breaks off.

Let us now examine some kinds of tools for other purposes. After the shaft or the work, whatever its nature, has been roughed out, it must in most cases be finished or polished. Polish is not always essential, but is indispensable in fine work, for a nice fit depends on the regularity or smoothness of the surfaces in contact. In former times it used to be the custom to turn a shaft as smooth as possible, to shift the belt on to the fast speed, and with a number of files, a great display of emery and oil, and polishing sticks, do what the turner should have done with the tool. The American mechanic of the present day knows a better process than this, which occupies but half the time. The emery used to get on the shears and in the feed screw, and wear them out rapidly; after polishing very large shafts, or other work, there was half a days' work to be done in cleaning the lathe so as to make it fit for use. The character of the finishing tool used in former times is but little changed, not enough to affect it, but the manner of using it is better understood. This is a good finishing tool, but success in using it depends on having

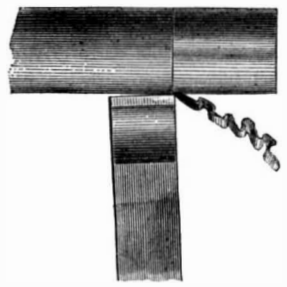
Fig. 13.



it well tempered and ground, and carrying a light cut. Just enough should be left in roughing to take out the tool marks and then the shaft will be true, and handsome in appearance.

This tool is not to be placed square across the shaft, or with its face bearing on it, but as in this diagram, so that the corner engages first and not the

Fig. 14.

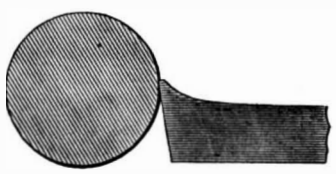


ace. In this position, if an irregularity is met on the shaft the corner is sharp and cuts it off, but where the face is engaged first, the edge glides over and the shaft springs, thus making an untrue spot.

This tool should in all cases be very slightly rounding on its face, in line with the shaft, and have but little clearance below so that the cut will be nearly straight, for in this way it works smoother than when it rakes a good deal. Every tool has its use; the diamond point, or its substitute, for roughing; the round nose for fillets; the square nose for square corners; and so on to the end of the chapter, and it is as much folly to take one kind of tool for general use as it is to take one medicine for all ailments.

When a tool is properly made and ground it depends very much upon its position whether it cuts well or not. If the cutting point or edge, as the case may be, is set below the center of the lathe it will not work properly and is dangerous, for the tendency of the work is to roll up on it and leap out of the centers. When this occurs a double mishap is the result, for the work is not only injured but the lathe shears and carriage are also endangered and oftentimes broken across, if the shaft be a heavy one. To cut well, the point of the tool should be slightly above the center of the shaft, and the shape of the tool below should be such that no part of it bears against the job. If it does bear, the shaft will not be true when done, and the tool will feed irregularly; sometimes it will jump in and take out a huge piece, at others it will not do anything. This defect of a bearing on the work below the tool is shown in the appended engraving.

Fig. 15.



A side-cutting tool, or one that approximates to it, works in the same way when it has a bearing below the edge; the cutting part is crowded off by the pressure below until the spring of the tool forces the edge in heavily, then it takes out a "chunk" and stops until the feed forces it up again. Good, smooth, free and true turning can only be produced by tools which cut where they should cut, and bear no where else.

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FOREIGN INTELLIGENCE.

At the Academy of Sciences, Paris, on the 7th inst., a communication was read by M. Weil, "On New Processes for Covering Metals with Firmly Adherent and Bright Layers of other Metals." The method consists in dipping the metal to be coated in a saline solution of the metal to be deposited, rendered distinctly alkaline with potash or soda, and mixed with some organic matter, such as tartaric acid or glycerine. At the same time, it is necessary in some cases to set up a weak voltaic current by keeping a piece of zinc or lead in contact with the metal. In this way the author obtains a firm layer of copper or iron and steel, and procures various and beautiful effects according to the thickness of the copper deposited. Silver, nickel, and other metals can be applied in the same way. The process, it will be seen, is susceptible of numerous applications. A curious fact mentioned is that a clean surface of copper may be coated with zinc by placing the two metals in contact in a solution of caustic soda or potash. In the cold the deposite of zinc takes place slowly, but at 100 degrees, it is effected rapidly.

The Gorilla.—A letter from M. du Chaillu to Sir Roderick Murchison was read, in which he stated that he was about to proceed into the interior of Africa. He purposed pursuing the line of the equator, until he came to some large river flowing northwards, which he intended to follow till it reached the Mediterranean, and he hoped in that manner to come to the mouth of the Nile. He was taking with him one hundred people, forty of whom would be employed in carrying his guns and ammunition, of which he hoped to make great use. He said he had caught three gorillas, which he intended to have sent alive to this country, but two of them had died. The other had been shipped to England, and he hoped it would arrive safely. He had forwarded also some fine skeletons of gorillas, and many other specimens of natural history.

A New Match.—A lucifer match is now in the market that differs from anything hitherto in existence. Upon the side of each box is a chemically-prepared piece of friction-paper. When struck upon this, the match instantly ignites; when struck upon anything else whatever, it obstinately refuses to flame. You may lay it upon a red-hot stove, and the wood of the match will calcine before the end of it ignites. Friction upon anything else than this prepared pasteboard has no effect upon it. The invention is an English one, and, by special act of Parliament, the use of any other matches than these is not permitted in any public buildings. The discovery is a curious one. There is not a particle of sulphur in the composition of the lucifers in question.

Steel Wire Rope.—Some important experiments were lately made with galvanized steel wire ropes at the Dock Testing Works, Birkenhead. The testing showed the following extraordinary results—4½-inch steel wire rope, 57 tuns cwt., the Admiralty test for charcoal wire of this size being 24 tuns 8 cwt.; 3¼-inch steel wire rope, 24 tuns 6 cwt., Admiralty test for charcoal wire of this size, 13 tuns 10 cwt.; 2¾-inch steel wire rope, 19 tuns 6 cwt., Admiralty test for charcoal wire of this size, 8 tuns 11 cwt.

Indestructible Writing.—Lucas proposes for this purpose an ink composed of 20 grains of sugar dissolved in 30 grains of water, to which is added a few drops of concentrated sulphuric acid. Upon heating this mixture the sugar becomes carbonized, and when applied to the paper leaves a coating of carbon, which cannot be washed off. This stain is rendered more permanent by the decomposing action of the acid itself upon the paper, and thus made, it resists the action of chemical agents. The paper should, after drying, be passed through a weak alkaline solution to remove excess of acid.

Temperature of Hot Springs.—The most celebrated hot springs of Europe, such as the Aix-la-Chapelle, Baden-Baden, Naples, Auvergne and the Pyrenees, have not declined in temperature since the days of the Romans, for many of them still retain as great a heat as is tolerable to the human body, and yet, when employed by the ancients, they do not seem to have required to be first cooled down by artificial means. This uniformity of temperature has been thus maintained for some two thousand years.

Mr. Van Winckle, a scientific American engineer, recently attended in the factory department of Woolwich dockyard, by permission of the Lords Commissioners of the Admiralty, and submitted to the inspection and trial of Mr. Trickett and the officers of the department a portable drilling machine, to be used with advantage in punching rivet holes in ships' boilers. The machine was put through a succession of tests by each of the officers present, who admitted its great efficiency and superiority over any other apparatus which had been brought to their notice.

Went off in a Flash.—A pyrotechnist who was sick, and knowing that he could not live long, caused his workmen to make a series of candles, which after burning a short way, as usual, would suddenly reach a stratum of pyrotechny and go off in the best style. These candles were given to the priests who at the funeral services were to sing Gregorian chants around the corpse; and while engaged in this solemn act the fireworks went off with full brilliancy, to the great consternation of the ecclesiastics.

Great Bridge over the Seine.—The West of France Railway is having constructed for a direct line from Rouen to the Paris and Cherbourg line a great bridge over the Seine. The bridge reposes on five cast-iron piers, the distance between these being 166 feet, so that the total length of the bridge is 933 feet. It is constructed for two lines, and is about 45 feet in width. The contractors are the Creuzot Works.

The Goodyear Patents Again.

The Washington correspondent of the *Herald* states, that the question of extending the Goodyear India-rubber patents is already revived, and that the lobby is expected to be in full blast immediately after the holidays. An effort was made last year to steal it through unnoticed. The lobbyists imagined that they had so covered their tracks, that they would not be discovered until the committee reported in favor of it, and the bill providing for its extension was placed upon its final passage, with a sufficient number committed to the measure to carry it through. But in this they were disappointed. This year the advocates of that scheme are confronted at the outset with the opponents of the measure. It may, therefore, be said that the *pros* and *cons* of this scheme are on hand. The latter are exceedingly sanguine that they will be able to defeat the schemes for extending the exclusive privilege of the owners of this patent to add millions of dollars to their large fortunes at the expense of the public generally. There is, however, every indication of an interesting controversy. The owners of the patent are making a desperate effort.

Comparative Strength of Liquors.

Dr. Jones, physician of St. George's Hospital, London, in a recent lecture, stated that the different fermented liquids which he had examined might, in regard to their strength or stimulating power, be thus arranged:—

Cider	100	Claret	166	Marsala	341
Porter	109	Burgundy	191	Port	358
Stout	133	Hock	191	Sherry	358
Ale	141	Champagne	241	Geneva	811
Moselle	158	Maderia	325	Brandy	986
Rum	1243				

Thus ten glasses of cider or porter, six glasses of claret, five of Burgundy, four of Champagne, three of sherry, are equivalent to one glass of brandy, or three-quarters of a glass of rum. The reader must always bear in mind, however, that of the large amount of brandy, so-called, sold in liquor shops, but very little is pure brandy.

Petroleum Stock Companies are increasing so rapidly that it has become a troublesome matter to find names for them. We have now the Cosmopolitan, Rennekoff, Huidekoper, Inexhaustible, Maple Shade, Radiant, Revenue, Allegewi, Brilliant, Diamond, Big Tank, Tarr, Tack, Blood, Tarentum, Tidioute, Tionesta, Organic, Van Buren, Buchanan, Webster, Pit Hole, Horse Neck, Oak Ball, Sled Ford, and so on through a vocabulary of probably, by this time, five hundred different organizations.

We suggest to the refined petroleum Oil Stock gentry, that a committee ought to be appointed at once to hunt up new names. The list will soon run out—at the rate things are going.

MR. DODGE ON BREECH LOADERS.

The following private letter was addressed by Mr. Dodge to a friend in this city, and was not designed for publication; but labors so patriotic, so long continued, so wisely directed, and finally crowned with such triumphant success, should have at least the meed of recognition; we therefore take great pleasure in laying the letter before our readers.

Friend V—— S——: When the present infamous rebellion first broke out, a few earnest men of the nation, seeing and realizing the tremendous advantage to be derived from the use of breech-loading fire arms by our troops, set earnestly to work, to advocate their adoption by the Government, and their introduction into our armies. These efforts were put forth by the different parties, without any concert of action or understanding—each operating in his own locality, and through such mediums as most readily presented. Among those who joined heart and soul in this effort was myself, as the various articles in the Scientific American, signed "Rifleman," and dating back as far as 1861, will testify. Not only did I write upon the subject, but I talked it at all times and to all persons, from citizens to senators, until it became a common saying among my friends, that I had "breech-loaders on the brain." So profoundly impressed did I become with the importance of the matter, that in the latter part of 1863 I employed all my leisure time, day and night, in hunting up all the testimony I could find, both at home and abroad, published or unpublished, in favor of breech-loading arms. I visited hospitals and camps, conversing with men and officers, and addressed letters to nearly all the commanding officers in the field. The testimony thus accumulated I embodied in a pamphlet Memorial to the Secretary of War, published at my own expense, and distributed it gratuitously among government officials from President down. By many these efforts were sneered at, as being the work of an enthusiast; and even some officials—mentally small men, made temporarily great—in their own estimation—by being clothed "with a little brief authority," did not hesitate to denounce my efforts as being "in very bad taste," to say the least.

Without arrogating to myself any special credit in the matter, or being vain enough to suppose that my efforts did much toward accomplishing the desired result, in common with those who thought as I did, I now have the satisfaction of knowing that, at last, the idea has prevailed, and breech loaders are triumphant. Not only have a large number of regiments been armed with them, but the Government has recently given a contract for making no less than seventy thousand of the Spencer Magazine breech-loader, and has also contracted for large numbers of single breech-loaders. More than this, a board of officers is ordered to convene at Springfield on the 4th of January next, to determine upon, and recommend *for adoption*, the best kind of breech-loading gun and carbine, and also the best style of Magazine gun. It is to be presumed, therefore, that the Government has finally concluded to abandon the manufacture of the old fashioned muzzle loaders, and to adopt in its stead, a breech-loader—surely a most important step, and in the right direction. Thus my prediction that the muzzle loader would eventually be superseded by the breech-loader, and the former be found only in the museums and shops of curiosity-mongers, seems likely to be realized much sooner than even I then had reason to hope. What a pity that the Ordnance Department had not sooner been placed under the control of its present progressive head; the nearly half million muzzle loaders now lying idle in our armories and depots, would then have been made breech-loaders instead, and our entire armies have been provided with them. Had that been done we should have had far more such glorious victories as those of Sheridan, Sherman and Thomas, and the nation could have been saved thousands of lives, and millions of treasure.

In the mean time, the papers inform us that the entire French army has been armed with the Prussian rifle—the needle gun—which is also a breech-loader; and that the English Government has advertised for proposals for changing the Enfield rifle to a breech-loader, for their army. Thus it will be seen that we have not moved any too soon in the matter,

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and that those of us who so earnestly advocated the change, have reason to feel specially gratified with the result.

In Vol. 8, page 5, of the SCIENTIFIC AMERICAN, may be found a communication of mine, dated Dec. 20th, 1862, in which I advocated these three points, giving my reasons therefor, viz. 1st, reducing the bore of the gun so as to reduce the diameter of the ball and thereby lessen the resistance of the atmosphere to its flight—2d, elongating the ball so as to retain the proper weight of metal, and thus give it momentum—and, 3d, chambering the barrel so as to burn a greater quantity of powder, and thus secure a propelling power proportioned to required velocity and weight of projectile. I now have the satisfaction of knowing that these ideas have all been adopted by the Ordnance Department, and are to be applied to the guns now being built. Without claiming any special credit for my ideas on this subject, I think I may properly feel special gratification at this official confirmation of the correctness of the views I then advocated.

So, too, on page 70, of Vol. 9, I stated the reason why our monster cast iron guns were comparatively a failure; and I now have the satisfaction of seeing my ideas on this subject fully sustained by the wonderful result of the Ames gun at its recent trial.

While on this subject I wish to place on record this prediction—that the improvements now making and yet to be made in artillery, will enable us to pierce any iron clad that can be made to float, as easily as the old thirty-two pounder did our wooden vessels. Of this I have not the least doubt; but such results will never be obtained by guns of cast iron.

This whole subject has been to me one of the greatest possible interest, and all that I have done in reference to it has been to me a work of love; for I have never had one cent's interest, direct or indirect, in any gun, factory, or contract. I did want to see our government avail itself of all the means in its power to crush the rebellion; and I felt certain that our inventors were capable of furnishing the means in the way of arms, if the government would only adopt them; and sometimes, when I saw the reluctance of those in authority to move in these matters, it did seem to me that they acted as though they were afraid we would be *too* successful; I have often thought that if our country survived, in spite of the combined energy of the rebels, and the want of it on our own part, it will be proof against anything that can assail it in the future. It is, however, exceedingly gratifying to all loyal men to know, that at last we have at the head of the Ordnance Department men who can see and appreciate common sense ideas, even though they do come from civilians.

W. C. DODGE.

Washington, D. C., Dec. 26, 1864.

[We wish it to be understood that we do not endorse our correspondent's opinions in relation to cast-iron cannon. The problem in regard to the best material for heavy ordnance is not yet definitely solved. —EDS.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Devices for Stopping Leaks in Boiler Tubes.—This invention consists in the application to a leaky boiler tube of a split ring, with or without a bead, in combination with one or more expanding wedges, in such a manner that by the action of said wedge or wedges the ring can be secured in the interior of the tubes, and the leak be stopped. If the ring is to be applied to the end of the tube near the tube sheet, it is provided with a bead to fit into the cavity of the tube, close behind the tube sheet, and the leak can be stopped simply by expanding the tubes, or an open cap may be attached to the ring by screw bolts or other suitable means secured to the ring by ears or large projections from its inner surface, in such a manner that by introducing suitable packing between the inner surface of said cap and the tube sheet the leak is stopped without interfering with the draught, and the cap can be secured in its place at any moment, and without the necessity of boring holes in the tube sheet. These improvements are covered by two patents in the United States, and applications have also been made for patents in Europe. R. Lavery and S. Stuart, of South Boston, Mass., are the inventors.

Sand-papering Pencils, Etc.—This invention consists in the employment or use of one or more racks provided with slots, each capable to receive a pencil or other similar article to be sand-papered, in combination with a revolving disk, the surface of which is covered with sand, emery, or other suitable polishing material, in such a manner that by the rack or racks the pencils or other articles are held in the proper position while they are whirled round by the motion of the polishing disk, and their surfaces exposed to the action of the polishing material; and for the purpose of keeping the pencils or other articles down upon the polishing surface with a uniform and yielding pressure, the racks are provided with covering plates, resting loosely on the articles to be sand-papered. Furthermore, by imparting to the racks a reciprocating motion the operation of sand-papering is executed with superior uniformity. A cover placed over the racks and the polishing disk prevents the escape of dust except through the spout through which it is expelled by the action of fans or wings at the under sides of the arms supporting the polishing disk, and which conducts the same off and prevents it producing an injurious effect on the health of the operative or operatives. Philip Schrag, of New York City, (assignor to Eb. Faber, No. 133 William street), is the inventor.

Thrashing Machine.—This invention relates, first, to an improvement in the discharging device of the machine for carrying the straw over the riddle after the former has passed between the thrashing cylinder and concave. The object of this part of the invention is to cause a thorough separation to be made of the thrashed grain from the straw by regulating the passage of the straw over the riddle so as not to admit of its being discharged too quickly over the latter, and before the grain is separated from it, and, at the same time, insure its passing along sufficiently quick to prevent the thrashing cylinder becoming clogged or choked. The invention relates, second, to a novel and improved manner of hanging the grain receptacle or carrier, whereby the same is made to operate more efficiently than hitherto. The invention relates, third, to an improvement in the construction of a wooden shaker whereby the journals of the same are protected from wear. The invention relates, fourth, to the combination and arrangement of the several parts as herein shown and described, whereby the operation of thrashing the grain from the straw and the separation of the former from the latter is effected in an expeditious and perfect manner. George Westinghouse, of Schenectady, N. Y., and Lorenzo Smith, of Sharon Springs, N. Y., are the inventors.

Gaveling Attachment for Harvesters.—In this machine provision is made against stopping, each standing attendant being able to maintain an erect position while at work, either raking or binding. The grain is raked from the "grain platform" on to a hinged platform which receives an upward movement with each revolution of a rake. By the latter the grain is raised to an elevated position up against the side of a stationary concave corresponding in form to the arc described by the teeth of the revolving rake. After the grain, in being raised upward, passes the upper edge of the stationary concave, it is sustained by the teeth of the revolving rake and a series of flexible arms. At this point a set of gaveling fingers, operated by a very ingenious contrivance, embrace the grain and hold it firmly until the revolving rake, by bending and continuing to move round, disengages itself from the grain. The fingers, with the grain thus gaveled, move backward, in doing which the flexible arms are bent down, they offering little resistance but assuming automatically an upright position as soon as the vibrating fingers stand over the dumping platform, where the bands are made and applied by the attendants. James W. Harvey, of Marshalltown, Iowa, is the inventor.

Exercising Machine.—This invention consists in the employment or use of one or two platforms provided with adjustable or sliding counterpoises or weights, and arranged on hinges in a suitable framing in such a manner that the portions of the body may be exercised in a greater or less degree, as the condition of the patient may bear, for the purpose of exercising the spinal and abdominal muscles. The invention further consists in the novel application of slides to the platforms, as hereinafter set forth, whereby the slides are made, during the oscillations of the platforms, to move or slide to conform to the movement of the body, and prevent any friction between the latter and the platforms. Dr. Charles F. Taylor, of New York City, is the inventor.

Truss and Supporter.—This invention relates to an improvement in the back braces of trusses or supporters, and it consists in combining with such back braces a staple which straddles the body spring so as to allow sufficient play for any movement of the body. The four pads which are secured to the ends of the back braces and intended to bear on either side of the spine are of an oval or any other convenient form, and they are capable of being moved to any angle best suited to the conformation of the back. The invention consists also in the application of an adjustable spring in combination with a ball and socket joint, which connects the front part to the body spring, and with a friction plate connected to the lower margin of said front part in such a manner that by said spring any pressure desirable can be given upon the lower margin of the front pad, imparting to said pad an upward or backward motion, and by the friction plate free play is given to the spring and said spring is prevented wearing and cutting the pad. G. W. Taylor and A. E. Wright, M.D., of Philadelphia, Pa., are the inventors.

Machine for Pressing Hats.—This invention relates to a machine in which each hat is pressed by two operators, one half at a time with solid or non-expansible dies in such a manner that the same serves to press bell crowned and other hats; the male die used in this operation is made of wood so that the same when applied in combination with a steam die, will absorb moisture and by its forward motion in the die will produce the gloss which can not be obtained by the use of an expansion die. In order to save time in working the screw spindle which serves to impart motion to the male die, said spindle passes through a clutch nut which can be speedily thrown open in order to allow of moving the die by hand. Samuel G. Langdon, Mansfield, Mass., and Daniel C. Mowry, Milford, Mass., are the inventors.

Cartridge and Projectile for Fire-arms.—This invention relates to a mode of preventing or reducing the recoil of ordnance and fire-arms. It consists in fitting the chamber or rear part of the bore with a piston having one or more strong springs applied behind it. When the discharge takes place this piston gradually yields to the excessive force of the gases and so prevents their sudden action on the breech and greatly reduces the recoil. The springs employed in rear of the piston may be composed of india-rubber or of metal, but in breech-loading ordnance and fire-arms it is preferable to employ directly in the rear of the piston, springs composed of rings, disks or cylinders of india-rubber which, by their compression lengthwise of the bore are caused to be expanded circumferentially and thereby made to serve as a packing to prevent leakage of gases at the breech, and this part of the invention also consists in such use of india-rubber as a breech packing or breech loading ordnance and fire-arms. John F. Cleu, of New York City, is the inventor.

Governor.—This invention consists in combining with the governor and governor valve a weighted lever, so that by said weighted lever the valve is closed when the motion of the governor stops; further in the application of a self-releasing stop or catch in combination with the governor and governor or throttle-valve, in such a manner that by the action of said stop or catch the valve is held open and in position for starting the engine, and after the governor has reached or approached its proper speed the stop or catch is released automatically and the operation of the governor proceeds as usual; it consists also in the use of set saw and elastic seat for regulating the partial closing of the valve, and adjusting the same for wear as may be requisite and desirable. Robert W. Gardner, of Quincy, Ill., is the inventor.

THERE is an old woodman in the Windsor forest, England, who has spent a century in the forest. He has planted over 5,000 oaks with his own hands which are now huge trees.

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MANBRE'S IMPROVEMENTS IN THE MANUFACTURE OF GLUCOSE SUGAR.

This invention, patented by Mr. A. Manbre, of 81 Baker-street, Portman-square, London, has for its object improvements in the manufacture of glucose sugar. Glucose sugar is now commonly produced by boiling starch or fecula diluted in water acidulated with sulphuric acid. Open lead and wooden vessels are generally employed in this process. Close vessels provided with open escaping steam pipes are, however, used for the purpose of hastening the saccharification of starch by heating the mixture to a few degrees higher than 212° Fahr., and also to turn the steam into account by making use of it for other purposes. When the starch or fecula is found to be saccharified, sulphuric acid is neutralized by carbonate of lime diluted in water; the saccharified liquid is then drawn off and conveyed through bag and charcoal filters, and evaporated until it has acquired the proper degree of consistency required for obtaining sugar in a state of sirup or in a hard state. It is then cooled and supplied to the trade. In making glucose sugar in the above manner, a quantity varying from 20 to 50 per cent. of gummy matter is produced, which lessens the value of the sugar when it is to be used for producing brandy, alcohol, vinegar, or for fermenting purposes, whilst the essential oil and empyreumatic fatty matters which have been dissolved during the operation of saccharification remain combined with the glucose, inparting to it a bitter and empyreumatic taste, which empyreumatic taste is also imparted to the alcohol, brandy, vinegar, beer, and other beverages, when manufactured and produced from such sugar, either used alone, or jointly with malt or other matter.

Now, according to this invention pure glucose sugar is produced, commercially called grape and starch sugar, free from gum, also from bitter and empyreumatic tastes, by treating and submitting starch or fecula diluted in water acidulated with sulphuric acid to the action of a high degree of heat, the minimum temperature employed being not less than 275° Fahr., but 320° Fahr., being preferable, as the process is thereby quickened, by which means the whole conversion or transformation of gum into sugar is obtained, and the essential oil and empyreumatic fatty matters are vaporized and eliminated, which are distilled off out of the converting or saccharifying apparatus. The apparatus preferable to use for getting up the high degree of heat required to perform the improved process is a kind of boiler, called a converter—its shape and form are similar to a high-pressure steam boiler. It is made of strong wrought iron, capable of resisting a pressure of 90 lbs. to the square inch (six atmospheres), and is lined inside with lead to prevent corrosion, and outside is covered with a jacket, a space of four inches being left between the jacket and the converter, which interval is filled up with sand or any other non-conducting matter to prevent radiation of heat. The converter is further provided inside with a perforated lead steam pipe, through which steam passes and blows up into the mixture for heating it. It is also provided at its top with a pipe furnished with a cock, through which diluted starch may gradually be introduced into the converter; also with safety valves, steam gauge, water gauge, thermometer pipe for escape of steam, exit cock at bottom, and a worm or distilling pipe, through which the high pressure steam is allowed to blow off out of the converter, carrying with it the essential oil and empyreumatic fatty matters vaporised and gasified by the action of the high temperature to which the mixture is submitted.

In carrying out the process of converting starch or fecula into glucose sugar according to this invention, it is preferable to employ the starch or fecula, sulphuric acid, and carbonate of lime in the following proportions:—

2,240 lbs. (one ton) of starch or fecula.

1 120 gallons of water, being five times the weight of starch or fecula.

112 lbs. of suphuric acid, being 5 per cent. of the weight of the starch.

168 lbs. of purified carbonate of lime, being 7½ per cent. of the weight of the starch.

The manner in which the process is conducted is as follows:—Place in the converter above described 56 lbs. of sulphuric acid of 66 deg. density, diluted with 560 gallons of water; the mixture is then to be heated up to 212° Fahr. During the heating of the acidulated water in the converter, place into an open wood vessel, which may be called a diluting vat, provided with steam pipe, let-out cock, and with stirring apparatus, the other 560 gallons of water, in which is also to be diluted the other 56 lbs. of sulphuric acid, which acidulated water is also heated up to 85° Fahr.; as soon as this temperature of 85° Fahr. is attained, gradually pour into the said diluting vat the 2,240 lbs. (one ton) of starch or fecula, stirring the mixture well, and raise the temperature to 100° Fahr., the stirring maintained the whole time. Then gradually pour the diluted starch heated at 100° Fahr. into the converter, in which the acidulated water is kept boiling, continuing to blow in steam in order to keep the temperature in the mixture throughout this part of the process to its original heat of 212° Fahr.

When the whole of the diluted starch is introduced into the converter, shut off the cock of the pipe through which the diluted starch has been conveyed into the converter, and then continue to blow in steam so as to raise the temperature in the mixture up to 320° Fahr., equivalent to a pressure of six atmospheres, or 90 lbs. per square inch. When this temperature of 320° Fahr. is attained, open the cock of the worm or distilling pipe through which the steam escapes, carrying away out of the converter the essential and empyreumatic fatty matters which vaporise and gasify at about 270° Fahr.; hence by heating and maintaining the temperature in the mixture to the higher degree of 320° Fahr., not only are the said vaporised and gasified essential oil and empyreumatic fatty matters readily distilled off separate and got rid of, but also the whole of the gum converted into glucose sugar is obtained, which conversion takes place at the temperature of about 275° Fahr. Continue to heat and maintain the temperature of 320° Fahr. in the mixture, until by testing with iodine all the starch is found to be converted, and further until, by testing with silicate of potash or acetate of lead, it is found that there is no dextrine or gum in the saccharified liquid. For the purpose of testing proceed as follows:—Draw off out of the converter a sample of the mixture, then neutralize the sulphuric acid, pass it through a small bag charcoal filter, and when cooled submit it to the test of the above-described re-agents. The process of conversion or saccharification lasts from two to four hours, according to quality and purity of the starch or fecula. When the whole of the starch and gum is found to be thoroughly saccharified or converted into sugar, then draw the mixture into another open wood vessel, which is called a neutralizing vat, provided with stirring apparatus and let-out cock, and proceed to the neutralization of the sulphuric acid by gradually pouring into the said neutralizing vat the 168 lbs. of purified carbonate of lime diluted in 50 gallons of water, stirring the liquid to hasten the neutralization and the escape of carbonic acid produced during the operation. The neutralized saccharified liquid is then permitted to settle for from two to four hours, during which period almost all the sulphate of lime is deposited at the bottom of the neutralizing vat. The saccharified liquid is then drawn off and received into an open iron copper, called a precipitating pan, to proceed to the precipitation of the sulphate of lime, which remains in solution, and combined with the saccharified liquid. For that purpose introduce carbonic acid gas or oxalate of ammonia into the said liquid, and the sulphate of lime is precipitated and separated as carbonate or oxalate. Then pass the saccharified liquid through bag filters and receive it into an evaporating pan in which it is evaporated until it gets the consistency of sirup, viz. a density of 20° of Beaume's saccharometer; then draw the said sirup into a clarifying pan, called a blow-up pan, to be purified. For that purpose pour in and mix with the sirup a more or less quantity of calcined blood and charcoal powder according to the impurity of the sirup, when by heating it up to about 180° Fahr. foreign matters will coagulate and deposit at the bottom. Then convey the said clarified sirup through bag filters, then through charcoal and receive into a baking pan, in which it is evaporated and concentrated until it gets a density of 28° Beaume's saccharometer for producing glucose sugar in a state of sirup, and until it gets a density of 38° Beaume, for producing glucose sugar in a state of solidity or hardness. Then cool the glucose sugar and put it into any kind of cask, or otherwise for the use of the trade. Glucose sugar produced by the above improved process is quite pure, free from gum, acid, sulphate of lime, and from bitter and empyreumatic tastes. Its properties and chemical composition are identical to to those of grape and malt sugars. It will, therefore, be found economical and advantageous in producing beer, ale, porter, alcohol, brandy, gin, cider, vinegar, wine, ginger beer, liquors, &c.—*Mechanics' Magazine.*

India-Rubber.

In the last ten years there has been exported from Para 1,959,952 arrobas of fine rubber, and 378,792 lbs. of ordinary. The Brazillian arroba is rather more than 32 lbs. and hence the total shipments have been upwarda of 20,600 tons. Formerly the principal shipments were to the United States, now the principal exports are to the United Kingdom. Last year 65,649 cwts. were received in Great Britain from all quarters. The tree which yields the milky sap in South America is found in great abundance on the banks of the Amazon and most of its unexplored tributaries. Previous to 1840, it was exported in but small quantities, and chiefly in the form of shoes. After that period, new applications of the article having been made in England and the United States, the export of shoes was soon discontinued, but shipments in bulk largely increased; which increase, with some alterations owing to circumstances affecting consuming markets, has since been progressive. Stimulated to spasmodic exertions by profits which equal in a day the wages of a month given to ordinary work, the half-civilized laboring population of the province, neglecting the culture of the soil and those industrial pursuits by which they might be permanently benefited, flock to the marshy districts in which the rubber tree is found. There, passing many months of the year, with slight shelter and slighter clothing, with no sanitary regulations and no precautions against the malaria which pervades the banks of the Amazon and its tributaries—ravaged by intermittent fevers, and spending in nightly orgies the money so recklessly acquired, their numbers are fearfully diminished, and the population demoralized, with no benefit to themselves and no permanent advantage to the state, which is poorly compensated by a heavy export tax for the sacrifice of its prospective prosperity. As the rubber tree is found principally upon the public domain, upon which the right to labor without restriction or system is free to all, it is not likely that these evil influences will speedily be diminished. The tree is but little injured by the extraction of the sap. It is found in abundance on the islands at the mouth of the Amazon, and on the banks of that river and its affluents in the Province of Para—the Xingu, Topasoz, Amasoz, Gary, and Tocontins. Beyond the limits of the Province, higher up the river, even to the border of Peru, as new tributaries are explored, a more abundant growth is found, and there seems no immediate limit to the preparation of the india-rubber except the scarcity of hands for its collection and the unhealthiness of the districts in which it is procured. India-rubber is found in great abundance in the forests along the whole of the sea-coast of Ecuador, and there is much enthusiasm for the extraction of this elastic gum, which is already an important article of export. From the port of Guayaquil 2,227 cwts. were shipped in 1863.—*Journal of the Society of Arts.*

FRENCH INDUSTRIAL ART.—Some curious statistical returns may be gathered from the groupings of the produce of French industrial art for the past year, which, it may be observed, exhibits a marked decrease on that of the preceding year. Some of these items are singularly indicative of French frivolity:—Goldsmiths have sold for £2,350,000; jewelers, £1,800,000; false jewelry, £840,000; brushes, £1,000,000; canes and whips £152 000; false fair, £160,000. Artificial flowers figure for £480,000; fans for £132,000, and toys for £200,000. This last item shows how far more expensive are girls than boys. There art £60,000 worth of dolls manufactured yearly in France, and military toys—guns, drums and swords—figure for only £32,000.

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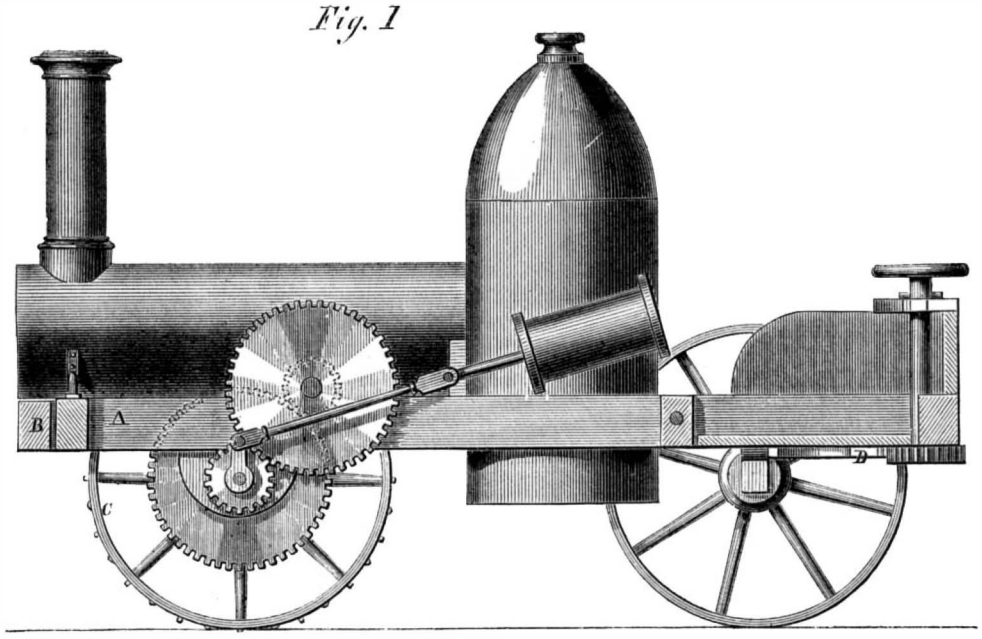
Improved Traction Engine.

Inequalities of surface have proved a great disadvantage to engines on common roads, for the jarring and jolting, consequent on motion, loosens the working parts, so that the whole machine gets out of repair quickly. As ordinarily made, with rigid frames, the adhesion of the wheels is very unequal, and at times, in the wrong place, so that the driving wheels exert no tractive force whatever. By the improvements in Figs. 1 and 2, illustrated the difficulty just adverted to is overcome. The engine and boiler, together with the principal driving wheel, there is but one, are attached to a frame, A, which is within, and attached to the exterior frame, B, at the back part. It will therefore be seen that the weight is always on the driving wheel, C, and its tractive force entirely independent of the position of the main frame and its wheels. The direction of the machine is given by the gearing, D, behind, and the whole power exerted by the cylinders is always available in ascending heavy grades or going over loose ground.

Fig. 1



BARNETT'S TRACTION ENGINE.

A patent was procured on this engine through the Scientific American Patent Agency, on the 22d of November, 1864, by G. W. Barnett, of Urbana, Ohio. For further information address him at that place.

The Sword-revolver.

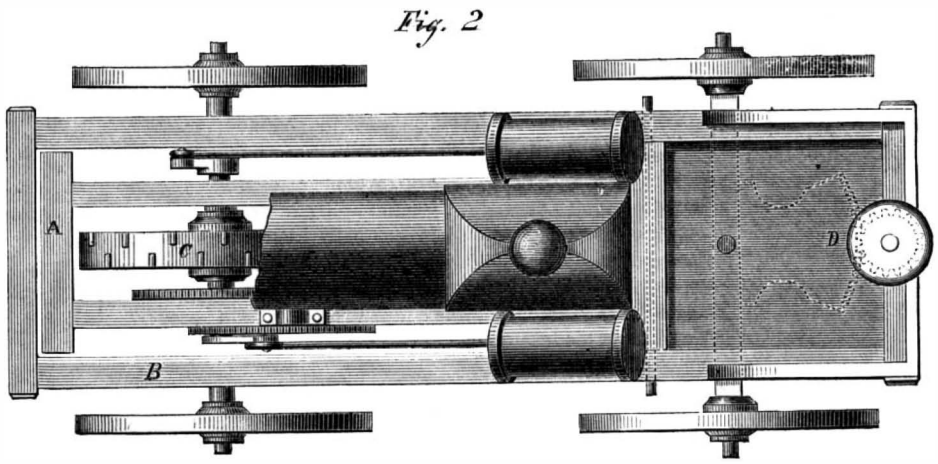
By a paragraph in the *New York Herald* of the 25th ult. we learn that M. Sieve Guilbert, an ingenious mechanic and practical workman in this city, has perfected an invention of his own in the completion of a very formidable yet elegant weapon of war, which appears in the shape of a saber and six shooter revolver combined. The saber is of the regulation length of the United States service, and in the cap of the steel hilt has the charging part of a six-shooter, which revolves in the usual manner, and discharges the balls through an aperture bored in front of the flat guard coming opposite the thumb when the saber is grasped in the hand. This combination enables the person so armed to use the pistol and sword at once, saving the necessity of looking after the pistol and disposing of the sword at the moment when suddenly attacked. M. Guilbert's invention will enable a man, in fact a boy, to discharge a couple of shots at his adversary, then guard, or cut and thrust, and shoot again as he thinks best. The weapon is not likely to get out of order.

M. Guilbert can find his sword-revolver ready made to his hand, and illustrated on page 88, Vol. IX. of the Scientific American. It was invented by Mr. Campbell of this city, and is the same thing in principle as the sword-revolver. It is really surprising to see the number of inventions that are re-invented. Time and study are thrown away which might be saved by a perusal of the Scientific American.

RAISING PETROLEUM.

A few weeks since we called the attention of inventors to the fact that the enormous increase in the production of petroleum opened an inviting and profitable field for their talent. Since then we have been pleased to notice that many improvements have been brought forward to facilitate operations in the Oil Regions, and we doubt not that the projectors of them will be amply rewarded therefor. One of the simplest as well as most promising of these inventions is that of Mr. Benjamin Frazee, of Bellville, N. J. This gentleman proposes to dispense with pumping the oil from the wells, and to raise it to the surface by a column of water. As it is well known that the specific gravity of petroleum is less than that of water, it follows that the oil will float if water can be introduced below it. This is done by Mr. Frazee's apparatus as follows: A tank is elevated on columns at any desired hight from the well, having a smaller pipe leading directly down through the well to the bottom. By merely opening a cock the water runs down through the oil and fills the pipe, of course forcing the oil out at the top of the well, where it is collected in the usual manner. A small model exhibited to us accomplished the object perfectly and the arrangement and conception are very ingenious.

Fig. 2



Commentary on the American War.

The London *Engineer's* Birmingham correspondent says:—"A strange comment on the American war presented itself at the implement department of the Birmingham show of last week. Messrs. Howard, the eminent manufacturers of Bedford, stated that they were now making 'plows with seats'—a class of articles that had come largely in demand in the American market, in consequence of so many persons having been sent back, maimed in limb, from the pursuit of war, to one of agriculture. These cripples, being unable to walk, were dependent on some mechanical contrivance for a means of getting their livelihood, and the plan of making for them plows with driving seats was hit upon."

[This, as the French say, is quite a "high novelty." Plows with seats have been used for years in this country, also on many other forms of agricultural machinery, so it cannot be the result of the American war.—Eds.

Who Invented Locomotives?

Who shall say that the introduction of the locomotive and the railway system was not expedited, and that, perhaps, by many years, through the energy, the talent, and the enthusiasm of a working man, whose name is even now to the general public totally unknown—John Steele?

Let the biographer of the Stephensons tell something of this unrecognized genius, for, at least in these pages, his name cannot be out of place. "John Steele," says Mr. Jeaffreson, "another of George Stephenson's early and most valued friends, is a man worthy of special mention. . . . . The son of a poor North-country man, who was originally a coachman, and afterward a brakesman on the Pontop Railway, John Steele, in his early childhood, displayed remarkable ingenuity in the construction of models of machines. His schoolfellows at Colliery Dykes used to marvel at the correctness of his imitations of pit-engines, and remember how in school the master could never 'set him fast' in figures. While he was still a school lad, his leg was accidentally crushed on the Pontop tramway. After leaving the Newcastle infirmary, where the limb was amputated, he was apprenticed to Mr. John Whinfield, the iron-founder, and engineer of the Pipeweil-gate, Gateshead. Here he attracted not only the attention and favor of his masters, but also of Trevithick, who in nothing displayed his consummate genius more forcibly than in the sagacity with which he selected his servants and apprentices." Steele afterwards joined Trevithick, and assisted in the manufacture of the locomotive constructed by that original mechanician in 1803—4. He then returned to Gateshead, and there "built the first locomotive that ever acted on the banks of the Tyne." . . . . . When it was finished it ran on a temporary way laid down in Whinfield's yard, at Gateshead. John Turnbull, of Eighton Banks, living in 1858, remembered the engine being made while serving his apprenticeship at Whinfield's, and said that, when completed, "it ran backwards and forwards, quite well, much to the gratification of 'the quality,' who came 'to see her run.'" . . . . Every word that came from Steele—Trevithick's pupil and workman, who had himself, within six miles of Killingworth, built a machine which, with all its defects, had actually traveled under the influence of steam—George Stephenson stored up in his memory. Steele was never weary of prophesying that "the day would come when the locomotive engine would be fairly tried, and would then be found to answer." No wonder that Stephenson caught enthusiasm from such a teacher. Poor Steele himself was eventually killed at Lyons by the bursting of the boiler of a steamboat, in the year 1825. It is to be feared that there are far too many Steeles, who, eminently useful in their positions, never find opportunities for raising themselves above them, and for whom the tide which leads on to fortune never flows.—*Mechanic's Magazine.*

The prize money standing to the credit of Admirals Lee, Farragut, Dahlgren, Bailey and Porter, is said to amount to three millions and a quarter.

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MARINE ENGINES.

That will be a white day for steamship proprietors which ushers in the marine steam engine as it should be. The screw engine is specially referred to, for although paddles will always be used to some extent there is little doubt but that to this mode of propulsion we must come at last. The screw engine of the present day is far from perfect. Engines for this purpose in this country are of many kinds, and their designs, with but few exceptions, have been imported from abroad; they are copied essentially from those made by English engineers. The engines of our gunboats and frigates are copied in plan from the back-acting English engines built by Messrs. Maudslay & Field. The vertical screw engines, sometimes called "steam trip hammers," are copied from "Clyde" makers. The oscillating engines are notoriously English. There are no other classes of engine in general use on steam propellers, if we except modifications in detail which cannot be called new designs.

The back-acting engine is an abortion. It has a very short connecting rod and twice as many piston rods as it ought to have, and while it is inconvenient to get at when working, it is open to the cinders or fine ashes which are often blown down the hatches. Let the main brasses be fitted perfectly, in a short time they will become loose, so that they can be heard thumping all over the ship. The vertical overhead cylinder has the same defects. In fact, with all engines that have short strokes and short connecting rods, the incessant pounding which occurs soon wears the parts under greatest strain, so that they are frequently out of repair. Add to this the fact that the inverted cylinder engine puts the weight far above the ship's center of gravity, that grease and "drip" from the stuffing boxes is continually running down, fouling and rusting all the bright work in its vicinity, and we have strong objections to its use. The oscillating engine is a good one, and gives excellent satisfaction when well constructed and put in place; some of the largest and swiftest of our Sound, lake and ocean propellers have engines of this class.

The ideal of a marine steam engine is the greatest power with the fewest parts in a small compass. Every five-eight bolt that is unnecessary is part of a system of complexity which ought to be abolished. Two piston rods, where one would suffice, come in for the same condemnation. And the crowning abortion is to multiply the number of cylinders where two would suffice, so that the ship's hold is a nightmare of rods, bell cranks, steam chests and counterbalances.

An engine which is completely within view in all parts when at work, which is accessible to be keyed up or otherwise adjusted without removing ten or twelve tuns of iron grating, which is compact without being crowded, and so proportioned that the strain is not all put on one part but distributed through the whole, would seem to possess valuable features. From it would result fewer detentions and delays from deranged machinery, fewer hot bearings, a lessened first cost and annual expenditure for repairs, and a general satisfaction and feeling of security to the engineers in charge, which would not be the least important point gained.

PATENTS ON SMALL THINGS.

An English firm has lately patented a peculiar shape for candle ends. By making them conical, or tapering, they will fit any candlestick without being papered or tinkered up in other ways. Now a very small royalty on each pound of candles will give a large annual revenue to the inventors, and the pecuniary value of their idea is seen at once. Similar instances might be given from cases at home, where inventors have originated some simple article in daily use and secured it, they have received large rewards. "Despise not the day of small things," says the proverb, and we may say, in addition, deride no idea as useless that tends to advance the arts and sciences, merely because it seems simple.

A very great misconception prevails in the minds of many persons in respect to patents. They are regarded chiefly as stepping stones to fame or passports to future notoriety. This is a huge delusion. An invention is first and principally an investment, just as an artist's picture, although an inspiration, is a commercial venture. The glory and renown attaching to either picture or invention is the afterpart, the dessert to the solid feast on dollars and cents. The natural result of the mistake alluded to, is, to lead persons to underrate the value of their ideas. It is not at all uncommon to hear individuals exclaim, "What, get a patent on that thing!" in alluding to some little affair that can be carried in the pocket. That very despised "thing" will doubtless be the foundation of a good fortune, as many a similar article has before it.

The improvement in some art or manufacture suggests itself to an individual, and he straightway applies it to his own use with very great advantage. Now what shall he do? Patent it and secure the fruit of his genius to himself, or give it to the world without price? The business man would say the former; because if notoriety be the object, great patents confer not only means but distinction, and where the first is attained the second follows.

SURFACE INDICATIONS OF PETROLEUM.

The paying wells of petroleum are shafts bored into cavities in the rocks, in which the oil has been collecting for immense periods of time. Petroleum is found in all the geological formations, but it is only in certain rocks that the caverns occur for its accumulation in large quantities. If a rock is found saturated with petroleum at the surface, it is absolute proof of the existence of the oil at that locality, but it is no proof of the existence of a great basin in the rock below, filled with the valuable fluid in quantities sufficient to pay for sinking a well.

SPECIAL.

Subscribers who bind the SCIENTIFIC AMERICAN should carefully preserve the frontispiece in the first number of the present volume, as we shall not be able to furnish it at the close of the year as heretofore.

BRISTOL'S IMPROVED TEA URN.—In our number for June 20, 1863 we gave an illustration of this improvemant, refering to which, the reader will perceive that the urn has two separate compartments, one for hot water, the other for the decoction of tea. The invention is now being brought into market, in good style, and promises to be extensively used. A practical trial convinces us that the good opinion of the article formerly expressed by us, was fully deserved. Arle Bristol, Detroit, Mich., is the inventor.

TO PRACTICAL MEN.

During the past year the SCIENTIFIC AMERICAN has received communications on various subjects from practical men of all trades. We devote one department of our paper to these communications, and feel that it is extremely valuable to our readers to hear what actual workers have to say. When a man writes what he knows and sends it to a newspaper there will be hundreds of readers to profit by it, and it may be the means of inducing others to forward their experience on the same subject. It adds to the stock of popular knowledge on practical matters, and is a source of advantage in many ways not necessary to detail at greater length.

We would, therefore, urge all those who have so kindly forwarded us their views on several subjects, to continue the correspondence, and others who read, but never write, to follow the examples alluded to, and give us the results of observation in any art, science, or trade. We make no restriction as to the subject or treatment, except that as regards the latter it must be brief. Neither do we agree to print every letter we receive, but we shall carefully consider each one solely on its merits. From this time forward we hope to present an attractive correspondence page every week.

THE BALANCE OF TRADE DELUSION.

The delusion in regard to perpetual motion is disappearing before the progress of knowledge, but the delusion in regard to the balance of trade retains its hold on the minds of many intelligent men with singular tenacity.

The balance of trade depends simply upon the way the books are kept at the custom houses.

A trader buys $100,000 worth of wheat in New York, and ships it to England, where, with the profits and freight added, it sells for $125,000. The proceeds are invested in lead, iron, cloth, and other articles, which on being brought to New York, with the freights and profits added, are worth $150,000.

In this case the export has just paid for the import, and the country has $50,000 worth of merchandise more than it had before.

Now, if the books at the custom house are so kept that the value of the articles is entered, at the prices paid for them, the balance of trade against us will be $25,000; if they are entered at their New York value, the balance of trade against us is $50,000; while if they are entered at their value in England, there is no balance either way. If the articles are entered either at our home valuation, or at the purchasing price, the more profitable is the commerce, the larger will be the balance of trade against us.

We have made this explanation before, but are prompted to repeat it by the reception of a pamphlet from Lorin Blodget, Esq., in which he labors through fourteen pages to show that, for the last four years the balance of trade has been in our favor, including gold, which is one of our staple products. As our merchants are shrewd, we do not believe that they have continued for four years the practice of exporting merchandise of more value in our ports than that which they have obtained in exchange. If they have, they have been doing a business unprofitable to themselves and to the country.

THE PETROLEUM OIL INTERESTS.

Let no one conclude from the tenor of our article in the last number, in which we exposed the oil stock swindle, that we intended to depreciate the valuable petroleum interests of the country These interests are of a most valuable character. Millions of dollars are annually realized from these flowing streams of light and heat, and thousands of our citizens are honestly employed in their development. The same is true also of all the great and inexhaustable mineral interests of the country. It will be found, however, that stripping off all the efflorescence of humbuggery, these vast resources are not developed without much loss in money and misapplied labor; and that thousands lose their honest investments and suffer bitter disappointment, simply for the reason, that following the general geological theory of mineral deposit, they do not happen to strike a vein, while some no more industrious neighbor near at hand does happen to hit upon the right s t and garners up a fortune.

By honest toil and y a judicious investment of

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money in oil property, we doubt not that as many men would get rich from this business as from any other, just as many, perhaps, and no more. The great thing that we complain of is, that a lot of relentless speculators heat up the money loving spirit of our people to a consuming fever; thousands are thus allured into the tempting snare, and lose, perhaps, their little all. It is absurd to suppose that the whole community are to be lifted suddenly upon the high places of wealth by these joint stock petroleum well companies.

THE CORRELATION AND CONSERVATION OF FORCES.

This is a collection in one octavo volume of 438 pages of the treatises on the new philosophy, by Professor Grove, Professor Helmholtz, Dr. Mayer, Dr. Faraday, Professor Liebig, and Dr. Carpenter, collected and arranged with a clear and comprehensive introduction of 32 pages, by Edward Youmans, M. D., and published by D. Appleton & Co., 443 and 445 Broadway, N. Y. Dr. Youmans introduces each of the treatises with a brief biographical sketch of the author. We extract that of Mr. Grove, who claims to be the first who taught the correlation of forces as a connected system.

William Robert Grove, an English lawyer and physicist, was born at Swansea, July 14, 1811. He graduated at Oxford in 1834, and during the next five years was professor of Natural Philosophy at the London Institute. Professor Grove is a rare example of the ability which has achieved a distinguished eminence in different fields of effort. While pursuing with marked success the profession of an advocate, he has devoted his leisure to original scientific researches, and obtained a high distinction both as a discoverer, and a philosophical writer upon scientfiic subjects. In 1852 he was made Queen's counsel, and afterwards Vice President of the Royal Society. He is the inventor of the powerful galvanic battery known by his name, and his chief reseaches have been in the field of electricity. Many of his experimental results are referred to in the following pages, which will also attest his high position among the founders of the new philosophy of forces.

We shall give a fuller account of this work when we have examined it more carefully; in the mean time we commend it to our readers, as being a complete exposition, by the greatest intellects, of the Conservation of Force, in its simple grandeur the the most sublime idea that the progress of knowledge has evoked from the human mind.

REDUCING CAST IRON TO STEEL BY CARBONIC ACID.

At the meeting of the Polytechnic Association on Thursday evening, Dec. 22d, Professor Fleury exhibited some specimens of cutlery which had been made by casting the forms in cast iron, and then converting the metal to steel by means of carbonic acid. The carbonic acid is obtained from carbonate of soda, of potash, or of lime. The cast iron articles are packed in an airtight box with the carbonates, and placed in a furnace, where they are subjected to a bright red heat for two days. The carbonic acid, which is set free from the carbonates, is decomposed by the carbon in the iron, giving up one equivalent of oxygen and becoming carbonic oxide, and the oxygen that is set free combines with the carbon of the iron to form also carbonic oxide. The 5 per cent of carbon in the cast iron is thus reduced to the 1½ or 1¾ per cent. necessary to form steel. If the operation is still further continued, the remaining carbon is removed, and the metal is reduced to maleable iron.

White charcoal iron is the best for use in this process, but it is found that gray iron is changed to white by the carbonic acid. White iron is formed by the chemical combination of iron and carbon, but in gray iron there is also some free carbon not chemically combined. This free carbon is first removed by the action of the carbonic acid, and the gray iron becomes white.

Professor Fleury further stated that this process does not make metal equal to the best steel, but good enough for hammers, shovels, plows, and agricultural implements generally.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING DECEMBER 27, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

45,570.—Pamphlet File.—R. M. Abercrombie, Rahway, N. J.:

I claim a case for the filing, marking and indexing of pamphlets and tracts, constructed substantially in the manner described in the foregoing specification and the annexed drawing.

45,571.—Ladies' Work Basket.—Seymour Ainsworth, Saratoga Springs, N. Y.:

I claim a ladies' work basket, constructed substantially as herein described.

45,572.—Safety Fuse.—John H. Andrews, Avon, Conn.:

I claim, first, The inner tube, B, as herein described, and also the coating of the same with rubber or other equivalent material, for the purpose herein set forth.

Second, The substituting of paper or paper parchment in the place of cloth or other material now used in the manufacture of tape fuses, substantially as herein described.

45,573.—Oil Well Pump.—E. H. Ashcroft, Lynn, Mass.:

I claim the tubes, C' and C'', for the escape of gas from the bottom of oil wells, thereby relieving the ower valve box from injurious pressure or opening which prevents the operation of the pump, the same located and operated substantially as described.

45,574. ~~Lamp~~ Trimmers Shears.—Wm. B. Barnard, Waterbury, Conn.:

I claim constructing improved shears or lamp trimmers, substantially in the manner herein set forth.

45,575.—Apparatus for filling Cigarettes.—Ezechel Berg, New York City:

I claim, first, The employment or use of the packer, B, and hopper, D, constructed and arranged so as to operate substantially in the manner and for the purpose herein specified.

Second, The mold or receptacle, F, constructed substantially in the manner herein shown and described.

45,576.—Twine-cutting Ring.—Theophilus L. Bishop and George K. Hall, Boston, Mass.:

We claim the new or improved twine-cutting ring, made substantially as described, viz: with the beak and the knife or recessed cutter, arranged and combined with the hoop and head of the ring, substantially as specified.

45,577.—Cess-pool.—George T. Bohen, San Francisco, Cal.:

I claim the angular or outwardly inclined walls in combination with the curved or straight partition wall and cast-iron oval plate above, substantially in the manner and for the purpose herein described.

45,578.—Ladies' Felted Skirt.—Almanzor W. Boynton, Norwalk, Conn. Ante-dated Dec. 13, 1864:

I claim, as a new article of manufacture, a whole skirt for ladies of one piece of felting, substantially as herein described and set forth.

45,579.—Machine for molding Sugar for Table Use, etc.—Leander W. Boynton, Hartford, Conn. Ante-dated Dec. 15, 1864:

I claim, ~~first, the~~ main cylinder, with its movable segments containing the cavities or molds, ~~in combination~~ with the rows or bars of plungers, when the whole is constructed, arranged and fitted for use, substantially as herein described.

Second, I claim the main cylinder and its series of plungers in combination with the upper cylinder armed with its series of projections, when they are constructed and fitted to produce the result, substantially as herein described.

Third, I claim the main cylinder and its series of plungers, in combination with the anti-friction rollers and cams when they are constructed, arranged and fitted to operate, substantially as herein described.

Fourth, I claim the combination of the main cylinder and its appendages with the vat and absorbing roller, when arranged and used substantially as herein described.

Fifth, I claim the adjustable cams, s, and ratchet wheels and cords in combination with the hopper when so constructed and arranged as to regulate the quantity of sugar in the molds, substantially as herein described.

Sixth, I claim the hopper, in combination with the spurred rollers, p p, when those rollers serve to support the superincumbent weight of the sugar in the hopper so as to prevent unequal pressure on the surface of the main cylinder, as herein described.

45,580.—Sawing Machine.—N. B. Brown, Antwerp, N. Y.:

I claim, first, The arrangement of the saw bar, D, connecting rod, H, crank pulley, C, rock shaft, G, and lever, K, connected with the guide, F, by the cord, c, substantially as and for the purpose herein set forth.

Second, The arrangement of the crank, f, on shaft, B, clutch, M, actuated by the levers, N O, rod, Q, rock shaft, V, arm, R, pawl, T, ratchet, U, and roller, S, all substantially as and for the purpose specified.

Third, In combination with the saw bar, D, and saw, E, I claim the double guide ways, a a b b, gliding gates, F J, and roller, I, arranged and employed in the manner and for the purposes specified.

[This invention relates to a new and improved machine for sawing wood transversely with the grain, and is more especially designed for sawing logs into pieces of requisite length for fuel.]

45,581.—Flat Iron-holder.—Frederick W. Brocksiefer. New Britain, Conn. Ante-dated July 10, 1862:

I claim, as a new article of manufacture, viz: a handle or holder made longitudinally in two or more parts, a a, and secured together by spring hinge, d d, or other mechanical equivalents, to act as a partial non-conductor of heat, substantially in the manner as and for the purpose described.

45,582.—Rock or Ore Crusher.—James Brodie, San Francisco, Cal.:

I claim the eccentric applied direct to the movable jaw when connected with the link, C, thereby giving the crusher an oscillating and eccentric motion.

I also claim the water chambers between the eccentric and the movable jaw, as described.

45,583.—Car Truck.—Nahum F. Bryant, Boston, Mass.:

I claim the combination with a car wheel and an axle upon which said wheel slides, of flanges or projections, e f, which control the extent of lateral movement of the slide wheel, and a device or devices placed on one or both sides of the hub for confining the wheel against the flange, e or f, and between said flange and the locking device, in the manner and for the purpose substantially as set forth.

I also claim the removable cylindrical collar to be placed between the hub and the flange, e or f, on either side of the wheel, substantially as described.

Also the manner of securing the collar in position upon the axle by means of the ring.

Also the springs which keep the ring from lateral movement.

I also claim in combination with a sliding wheel, the spline in the hub thereof, and the groove, in the axle, operating together to guide the wheel in its lateral movement, and to prevent its rotation on the axle, substantially as specified.

45,584.—Apparatus for making Extracts from Animal and Vegetable Substances.—John Chilcott, Brooklyn, N. Y. Ante-dated Dec. 20, 1864:

I claim the combination within the steaming vessels or digester, A, of the series of open perforated or granted shelves, B B, and the baskets, C C, for containing the matters to be heated, arranged upon the said shelves, substantially as and for the purpose herein specified.

45,585.—Machine for forming Baskets.—Thomas and Jehiel Churchill, Detroit, Mich.:

We claim the form or block placed on a horizontal shaft so as to rotate freely, and provided with any suitable fastening or fastenings for securing the splints and bottom to the form or block, substantially as and for the purpose herein specified.

[This invention consists in the employment or use of a form or block, made in the shape corresponding to that designed for the basket, said form or block being fitted on a shaft or mandrel so that it may turn freely, and all so arranged that the splints may be interwoven together on the form or block with the greatest facility.]

45,586.—Elastic Breech for Ordnance.—John F. Cleu, New York City. Ante-dated Dec. 22, 1864:

I claim, first, The combination of the breech block, A, sliding piston, C, packing spring and recoil spring, constructed and operating substantially as and for the purposes set forth.

Second, The sliding needle, j, constructed with a collar or shoulder, j, faced with india-rubber to act as a gas check, as and for the purpose specified.

45,587.—Apparatus for making White Leads.—Thomas J. Coggeshall, New York City:

I claim, first, Surrounding the sides and top of the corroding rooms, wherein metallic lead is converted into carbonate of lead by the process above described, with a stratum of air confined between double casements of glass as herein described, for the purposes specified.

Second, Connecting one or more of the vests, in which the acetic acid is formed, with one or more of the generators in which the carbonic acid gas is formed with one or more of the corroding rooms by means of pipes, fitted with stop cocks, as shown, and operated by a pump, F, substantially as described for the purposes specified.

Third, Providing each of the corroding rooms with a revolving frame upon which the metallic lead is suspended for the purpose of subjecting all portions of the lead to the uniform influence of the decomposing and carbonating agents.

45,588.—Machine for pressing Hats.—Samuel G. Congdon, Mansfield, Mass., and D. C. Moury, Milford, ~~Mass.~~ Ante-dated Sept. 24, 1864:

I claim, first, The use in a machine for pressing hats of two dies placed edgeways towards each other, substantially in the manner and for the purpose herein shown and described.

Second, The clamp nut, G, with toggle arms, d e, and hand lever, f, applied in combination with the screw spindle, E, follower, D, and die, E, in the manner and for the purpose set forth.

Third, The use of a wooden block, E, in combination with a steam die, B, constructed and operating substantially as and for the purpose specified.

45,589.—Steam Boiler.—Benjamin F. Cowan, New York City:

I claim, first, Combining in sectional steam boilers and other vessels of wrought or malleable metal for sustaining pressure from within, a stay rod, D, extending through the same, with the following joints, f, and the flanges, h, of the sections, substantially as described.

Second, I claim the sectional joints, f, of the several sections of the boiler made with curved or flaring edges, projecting inwardly, substantially as and for the purpose described.

Third, I claim placing anchors like J, or its equivalents, across the boiler or other vessels in the line of its diameter, substantially as above described.

[This invention consists in making a boiler in sections united by means of flanges which project inwardly from the circumference of the sections, the end sections being rounded at their outer ends and the sections being held together by a rod extending axially through them and secured by means of washers and nuts, thereby making a boiler capable of vibration without tearing open its joints.]

45,590.—Apparatus for graining Pails.—J. R. and A. J. Cross, Chicago, Il..:

We claim, first, Constructing the bed of elastic material used in graining machines in the form herein shown, substantially as and for the purposes specified.

Second, We claim arranging the elastic material aforesaid, whether curved or rectangular in form in a series of distinct staves or designs, substantially as and for the purposes herein shown and set forth.

Third, We claim the arrangement of the expansible plate, E E, and the handle, F F, provided with the hinge, h, and spring, s, as and for the purposes described.

Fourth, In combination with the last foregoing, we claim the employment of the handle, C, and plates, D D, as and for the purposes shown and described.

45,591.—Stone-cutting Machine.—Gustavus Cuppers, New York City:

I claim pivoting the chisel frame, H, to the main frame, E, of the stone-cutting macoine so as to maintain a vertical position or to adjust the inclination of the chisel for rough hewing and finishing, substantially in the manner and for the purposes described.

I also claim the combination of a pivoted adjustable chisel frame with a spring or recoil chisel, when constructed and operated substantially as and for the purposes described.

I also claim the combination of the pivoted adjustable chisel frame, H, with the frames, E and S, for the purpose of feeding the chisel in two different directions over the stone, substantially as herein described.

I also claim the combination of the frames, A B E, with the sliding and hinged chisel frame, H, and spring or recoil chisel, K, when constructed and operated substantially as and for the purpose described.

45,592.—Shingle Machine.—E. Drake, Gardiner, Mich.:

I claim, first, The arrangement of the rack, D, pinion, D', levers, K L G, and the loaded lever, H, all combined with the plate, P, to regulate the feed movement of the frame, C, as set forth.

Second, The lever, W, provided with the pawls, V V', in connection with the oblique slat, d', in the plate, X, and with the double adjustable ratchets, u u', or with single ratchets, for the purpose of giving and regulating the lateral feed movement of the bolt, for the purpose specified.

[This invention relates to a new and improved shingle machine of that class in which a circular saw is employed for cutting the shingles from the bolt, and the invention consists in a novel means employed for feeding the bolt to the saw, and also in a novel means for adjusting the bolt so that the same may be cut of any required thickness and of different tapers as may be required.]

45,593.—Mode of attaching Thills to Axles.—Edward Dugdale, New York City:

I claim the thill iron, E, provided with the clip, F, and the flange, G, and fitted on the arm, B, of the axle between the two shoulders, C, D, with the inner part of the hub projecting over the flange, substantially as and for the purpose herein set forth.

[The object of this invention is to obtain a means for attaching thills to axles which will admit of the former being fitted and secured to the latter with the greatest facility, and also of being readily detached therefrom, the invention at the same time admitting of the thill iron being readily tightened at any time should it become loose by wear or otherwise.

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45,594.—Preserve Jar.—Timothy Earle, Valley Falls, Smithfield, R. I.:

I claim the use of a cover, A, the external surface of whose sides when the cover is in place, shall be coincident with the external surface of the neck of the jar, in combination with an elastic pressure band and a flanch, a, on the neck of the jar, substantially as described for the purposes specified.

45,595.—Animal Trap.—J. M. Flautt, Reedsburgh, Wis.:

In combination with the trap door, C, upright, B, weighted line, d, wheel, e, escapement, b, gate, D, levers, h j, and chain, i, all constructed and operating as specified, I claim the catch, f, spring f', and tappet, g', so arranged in connection with the aforesaid gate, D, and door, C, as to lock the gate, D, shut when the trap door, C, is open and release the gate when the door is shut, in the manner and for the purposes explained.

45,596.—Rotary Pump.—Randolph S. Foster, New York City:

I claim the eccentric cylinder, D, placed within the cylinder, A, and in relation with the pipes, B C, as shown in connection with the sliding abutments or cut-off working in a case, G, connected to the cylinder, A, all being arranged to operate in the manner substantially as and for the purpose set forth.

I further claim the construction of the sliding abutment of two plates, F H, one of which, H, has an independent sliding or adjustable movement, and provided with a packing, I, and spring, J, arranged to operate in the manner substantially as and for the purpose specified.

[This invention consists in the employment or use of a cylindrical case provided with a section and a discharge pipe and having within it an eccentric cylinder connected with a sliding abutment or cut-off; all being arranged in such a manner as to form a very simple and efficient rotary pump.]

45,597.—Raking Attachment to Harvesters.—John Fox and John W. Vanhook, Uniontown, D. C.:

We claim, first, A rake for a reaper constructed and operated substantially as herein set forth, in combination with the interior or central platform, constructed substantially as herein specified.

Second, We claim the arrangement of the means or devices herein recited for delivering the cut grain from the box or receptacle.

Third, We claim the raising of the main platform, so that a space exists between it and the cutter bar for the escape of the short grain and for affording the free operation of the rake, as described.

45,598.—Beehives.—Andrew H. Frank, of Buffalo, N. Y.:

I claim, first, The bee entrance or regulator, c, constructed and operating in a manner substantially as described.

Second, The removable miter pieces, H, constructed and applied in the manner and for the purposes suostantially as described.

45,599.—Steam-Engine Governor.—Robt. W. Gardner, of Quincy, Ill.:

First, In combination with the valve, e i, constructed substantially as described, and a governor adapted to close it by centrifugal action, I claim the weighted lever, C, employed to close the said valve when the governor stops.

Second, The self-releasing hook, stop or catch, F, applied in combination with the governor, A, and valve, e, substantially in the manner and for the purpose herein shown and described.

Third, The adjusting screw, l, and elastic seat, m, in combination with the valve, e, and governor, A, constructed and operating in the manner and for the purpose substantially as herein specified.

45,600.—Vapor Burner.—James S. Gray, of New York City:

I claim, first, The conical ring or supplementary heater encircling the heater cap, substantially in the manner described.

Second, The combination of a heater cap and ring heaters with a fluid chamber by means of conductors arranged and operating so as to communicate heat both to the top and bottom of the fluid chamber, as described.

Third, The division wire, H, or its equivalent, to divide the jet and prevent hissing, as set forth.

Fourth, The combination of a fluid chamber, conductors, division wire and heater cap, substantially as described.

Fifth, The combination of a fluid chamber, division wire, heater cap and ring, substantially in the manner described.

Sixth, Constructing the fluid chamber with a central tube for the screw valve, to prevent overflow and impart heat, as described.

Seventh, The combination of the fluid chamber, central tube and perforated screw cap, when constructed, arranged and operating as described, for the purposes specified.

45,601.—Self-sealing Can.—John F. Griffen, of New York City:

I claim, first, The lip or cover, D, formed with a depression, e, and a vent hole, k, the whole constructed to operate in the manner set forth.

Second, I claim forming the packing ring or gasket, S, with a lip, t, so as to protrude from the jar and cover (where they come together) at the point only where said lip is formed, as and for the purpose set forth.

Third, I claim the combination of the tapering neck, c, and packing ring, h, with the cover, D, when the latter is formed with a dish, e, vent, k, and recessed rim, D f, the whole arranged and operating together, as set forth.

45,602.—Mode of Raising Sunken Vessels.—Caleb Harrison, of Milwaukee, Wis.:

I claim the raising of sunken vessels and other bodies in the manner and by the means substantially herein recited.

45,603.—Steam Engines.—A. Hartupee, of Pittsburgh, Pa.:

I claim the receiver or moderator, F, applied in combination with the high and low-pressure steam cylinders, A and A', when the pistons are attached to a common piston rod, C, and the induction and eduction valves operated from a common rock shaft, and all arranged substantially as described.

[The object of this invention is an engine in which steam is used at a very high pressure (say 135 to 160 pounds to the square inch) in a small cylinder exhausting in a receiver of sufficient capacity for the steam to expand, thereby decreasing the back pressure, and allowing the temperature and pressure of the steam to fall to the proper degree to be used in a large cylinder working at low pressure, and exhausting into a condenser in which the steam is finally condensed.]

45,604.—Gaveling Attachment to Harvesters.—James W. Harvey, of Marshalltown, Iowa:

First, I claim the hinged platform, C, operated through the medium of a roller or pin on the arm, G, and a cam groove, E', in the wheel, E, substantially as herein described.

Second, In combination with the aforesaid hinged platform, C, I claim the concave, C', employed in connection with the rake, D D', to permit the grain from the grain platform of the harvester to be carried upward and delivered to the fingers which form the gavels, as set forth.

Third, I claim the grooves, h, and rollers or pins, l, employed in the described combination of the frame, I, bar, L, and pendants, L' L', for opening and closing the fingers, N N'.

Fourth, I claim the combination of the grooves, h', rollers or pins, j, frame, J, arms, J' J', and pendants, M M, whereby the fingers are moved forth and back, to receive and discharge the grain, as herein explained.

Fifth, I claim the yielding arms or retainers, Q, in combination with the spring, Q2, whereby the gaveling fingers are afforded access to the grain when above the concave, C, and the grain prevented from falling into the dumping platform in a loose condition, substantially as described.

45,605.—Horse Rakes.—H. R. Hawkins, of Akron, Ohio:

I claim securing the finger clearers, M, to a rod, which is pivoted to the rear extension pieces of the thills, substantially as and for the purposes described.

I also claim connecting the clearer fingers, M, with the treadle levers, O, in the rear of the axle, A, in such a manner that the outer ends of the clearer fingers are depressed when the rake is tilted, substantially as and for the purposes described.

I also claim the use of the lateral bed pieces, I, resting lengthwise on the thills, D, as a foundation for the platform, driver's seat and standard, rendering those parts easily removable for storing and transportation, substantially as and for the purposes described.

I also claim the combination and relative arrangement of the thills, D D, axle, A, cross bars, N O, teeth, C, and clearers, M, substantially as and for the purposes set forth.

45,606.—Turning Machines.—Abijah S. Hosley, of New York City:

First, I claim the employment or use of a rotary hollow cylinder, I, provided at one or both ends with sliding cutters, K, operated through the medium of a coil spring, R, and slides, L, for the purpose herein set forth.

Second, The toothed rim, O, pinions, N, and screws, M, operated by the cylinder, I, substantially as shown, for the purpose of moving the slides, L, as described.

Third, The dial, M', and index, N', employed in combination with a turning machine, substantially as and for the purposes herein specified.

45,607.—Safes.—Joseph P. Howard, of Brooklyn, N. Y.:

First, I claim a portable safe for containing coin, constructed substantially as above described.

Second, I also claim making slots, s, in one or more of the parts of the safe, so as to expose parts of the edges of the coin, substantially as and for the purpose above set forth.

[This invention consists in constructing a receptacle for coin which shall answer the purposes of a safe, a means of transporting the coin placed in it, and shall expose enough of the edges of the different pieces to enable them to be counted without removal.]

45,608.—Borer for Artesian Wells.—Henry Howson, of Philadelphia, Pa.:

I claim the employment for enlarging and chipping and scraping the sides of artesian wells, of chipping or cutting arms suspended within the well, and operated by a weight which is raised and permitted to fall, all substantially in the manner described.

45,609.—Car Trucks.—George G. Hunt, of Bridgeport, Conn.:

I claim the slotted axle box s, P P, in combination with the movable bolts, D D, and the truck frame, for the purpose of removing the axles and axle boxes from said truck frame with facility and dispatch.

I also claim the adjustable bolts, F F, in combination with the truss, K, in order to bring the weight of the car chiefly upon said truss, and thus throw the strain upon said truss in a line with the grain of the iron.

45,610.—Oil Cans.—Elam D. Hurst, of Lancaster, Pa.:

I claim the construction of the inner screw tube, C, with its lateral opening, f, and head, g, in combination with the double, B, for its reception and operation within the neck, A, of the oil can, substantially arranged in the manner and for the purpose specified.

45,611.—Locks.—James Hutson, of Janesville, Wis.:

I claim, first, The use of plate, C, in combination with supplemental bolt, D, ward, F, and key, G, when constructed and used substantially as and for the purposes described.

Second, Ward, F, having the double capacity of holding the main bolt, J, and supplemental bolt, D, firmly in place, substantially as described.

Third, Plate, C, when made with a beveled edge around the key hole, substantially as and for the purposes described.

45,612.—Cultivators.—Hanford Ingraham, of Naples, N. Y.:

I claim, first, The construction and application of a cast-iron flange-shaped wedge, for the adjustment of the thills, substantially as in the manner and for the purpose herein described.

Second, I also claim the construction of a T-shaped frame, in combination with the adjustable thills, as herein arranged, substantially in the manner and for the purpose herein set forth.

45,613.—Washing Fluid.—Danforth Johnson, of Chicago, Ill.:

I claim making a solution out of wood ashes and borax, to take the place of soap in washing clothing, as above described.

45,614.—Raking Attachment to Harvesters.—Robert V. Jones, of Canton, Ohio:

I claim the carved endless guide, H, in combination with the endless belt, F, provided with the rake, G, and arranged in relation with pulleys, to operate substantially in the manner as and for the purpose set forth.

[This invention relates to a new and improved raking device for reapers. The object of the invention is to obtain a device for the purpose specified which will be extremely simple in construction, operate perfectly, and be capable of being applied to any of the reapers in present use.]

45,615.—Cultivators.—John Kirkman, of Peoria, Ill.:

First, I claim the spring, E E S, and thumb screw, o, employed in combination with the levers, B B, to retain the plows in either a working or an elevated position, and secure the same against liability to injury by contact with immovable bodies, as set forth.

Second, In a machine constructed in the manner herein described, I claim supporting the neck yoke, y, and the end of the tongue, by means of bows, C, or their equivalents, fitting upon or over the top or upper part of the horse's neck, substantially as and for the purpose set forth.

[This invention relates chiefly to devices for adjusting the plows, the same being simple in construction, effective in operation, and of such a character as to be manufactured and applied at little cost. It also relates to the employment of yokes attached to the tongue and adapted to rest upon the upper side of the horses' necks, thus retaining the tongue in such an elevated position as to allow it to pass over the tallest plants without injuring them.]

45,616.—Mechanical Movements.—Silas H. Lancaster, of Leclaire, Iowa:

I claim the reversing rods, G G', adapted to retain one pair of pawls out of connection with its ratchet wheel while the other pair is in operation, substantially as described.

[This invention relates to the employment of rods, in connection with a driving shaft and two ratchet wheels fixed thereon, the use of the rods being to allow pawls to be retracted and advanced alternately in pairs, and thus the motion of a steam engine may be reversed without reversing that of the piston.]

45,617.—Car Brakes.—John W. Latcher and Wm. J. Powell, of Amsterdam, N. Y.:

We claim the arrangement of suspending or hanging brakes by means of ways or guides, in the manner substantially as shown and described and for the purpose specified.

In combination with the stationary guide, A, brake, B, rod or stem, V, and spring, c, operating as set forth.

45,618.—Devices for Stopping Leaks in Boiler Tubes.—Richard Lavery and S. Stuart, of South Boston. Mass.:

We claim the combination of the open cap, E, with the split ring, C, provided with ears, c, and secured in the end of a boiler tube, substantially in the manner and for the purpose herein set forth.

45,619.—Rings for Stopping Leaks in Boiler Tubes.—R. Lavery and S. Stuart, of South Boston, Mass.:

We claim, first, A sectional or split ring, to be secured within a tube by means of one or more wedges, substantially as and for the purposes herein described.

Second, We further claim constructing the aforesaid sectional or split ring, with a bead, a, to fit within the cavity, a, of the tube, in the manner specified.

45,620.—Book-binder's Cloth-cutting Table.—Charles Lemon, of Washington, D. C.:

I claim, first, The combination of the drawing and receiving roller, B, with the knives, D, and table, A, in the manner and for the purpose described.

Second, Constructing the drawing and receiving roller, B, in two tapering parts, e e, in the manner and for the purpose described.

Third, Mounting the knives upon stocks constructed in such a manner as to be clamped to the front edge of the table and adjusted in the manner described and shown.

45,621.—Machine for Making Paper Collars.—Thomas McSpedon, of New York City:

First, I claim the pushers, 32, constructed and operating as described, in combination with a collar-making machine, as described.

Second, I claim the friction roller, 39, and the cords, 40, in combination with the pushers, 32, as arranged with the cords or tapes, 41, and the folding knife, all operating substantially as described.

Third, I claim the arrangement of the stops, 33, and the embossing die, 13, as shown and described.

Fourth, I claim combining with the embossing die the punches for cutting or forming the button hole in the collar, g, when both shall be held in the cross head, 12, and operates by the connections, 11, and eccentrics, 9.

Fifth, I claim the male and female dies for cutting out or forming the collar and the embossing die, when the same shall be arranged and operated, substantially as shown.

Sixth, I claim combining the folding knife for holding the collar, with the male and female dies, and the embossing die, when the same shall be combined and operated as herein fully described.

Seventh, I claim the friction roller, 39, cords, 40, cords, 41, cords, 47 and 45, and grooved rollers, 44 and 46, which convey the collar from the embossing die to the folding knife, as described.

Eighth, I claim so constructing a machine for the manufacture of paper collars, or collars made from paper, combined with some fibrous or textile material, that the various operations of cutting or forming the collar, embossing and providing the same with the button holes, and finally folding the same, shall be accomplished continuously, and by one and the same machine, substantially as shown.

Ninth, In combination with the carriers, 30, constructed and operating as described, I claim the side guides, 34, for the purpose specified.

45,622.—Trusses.—Leverett Munson, of Saybrook, Ohio:

I claim the spring, A, arm, B, studs, a a, and holes, a' a' a' a', in combination with the pad, D, circular pieces, E, and ball and socket joint, Fig. 3, the several parts being constructed, arranged and operating as and for the purpose set forth.

45,623.—Many-barreled Cannon.—Gabriel Natcher, of Sidney, Ohio:

I claim a battery consisting of a circular or elliptical range of barrels, B B B, diverging in horizontal planes, a removable-chambered breech, F, adjusted to the said range of barrels by a shaft, C, and tongue, c, and an annular groove, f3, to communicate fire to the range of barrels or chambers from a single nipple, G, all as herein described and for the purpose specified.

[This invention relates to a gun or battery, consisting of a cluster of barrels diverging horizontally, and exploded simultaneously by powder contained in a circular groove formed in the movable breech piece.]

45,624.—Sorghum Evaporator.—Daniel B. Neal, of Indianapolis, Ind.:

I claim the inclined partitions, d, and inclined strainers, C, placed within the pan, B, substantially as and for the purpose herein set forth.

I also claim the straps, D, attached to the partitions, d, and the bottom, e, of the pan, substantially as and for the purpose specified.

I further claim the deflector or plate, D, attached to the under side of the bottom, e, of the pan, at the rear part of the same, for the purpose described.

[This invention consists in providing a sugar or evaporating pan with inclined partitions and strainers, whereby the strainers are prevented from filling up or choking during the process of the boiling of the juice, and a free flow of the juice between the several compartments of the pan allowed at all times. The invention also consists in a means employed for holding the bottom of the pan in proper position, preventing it from springing or warping, so that it will always fit snugly to the strainer. The invention further consists in the employment or use of a deflecting plate, attached to or arranged below the bottom of the pan in such a manner as to exclude the fire from the rear and finishing compartment of the pan.]

45,625.—Boom and Gaff Joints.—Joseph W. Norcross, of Middletown, Conn.:

I claim a boom or gaff joint with a triple motion, substantially as and for the purpose set forth.

Also, the swivel, a, in combination with the bracket or grooved rail, a', and with a boom or gaff, constructed and operating substantially as and for the purpose herein described.

Also, combining with a boom or gaff a universal joint, the fulcra of which are situated in one and the same vertical plane, substantially as and for the purpose specified.

[This invention consists in a boom or gaff joint with a triple motion, or composed of a universal joint, in combination with a curved jaw, in such a manner that the boom or gaff is free to accommodate itself to the position of the sail, and shut without straining the joint. The universal joint is so arranged that the fulcra of the same are situated in one plane, and a change of the position of the boom does not increase the strain on the joint as it does with joints of the ordinary construction, and when this joint is used for a gaff joint it is applied in combination with a slide secured to the mast, so that the gaff can be raised and lowered without obstruction.]

45,626.—Horse Rakes.—L. L. Pollard, of Worcester, Mass.:

I claim the combination with the hand lever, I, of the adjustable foot lever, K, when used for operating the rake head, substantially as herein set forth.

I also claim the combination with the rake head and chain support, H, of the stop lever, L, and spring, m, substantially in the manner and for the purpose described.

I also claim making the front chain support, g, adjustable on its lever, I, for the purpose herein stated and described.

I also claim the combination of the lifting and holding devices herein described, consisting of levers, I K, chain supports, H, g, chain, b, and spring, m, with the rake head, F, and axle, substantially as and for the purposes described.

45,627.—Cooking Stoves.—Daniel E. Paris, of Troy, N. Y.:

I claim an elevated oven cooking stove, having perforations, A, in the end plates, B, of an air chamber, C, arranged between the bottom of the oven and a fire flue, F, under it, in combination with an aperture or apertures, G, in the bottom of the oven, and an air passage or air passages, H, from the oven into a fire flue, I, along or around the oven, substantially as herein described.

45,628.—Sewing Machine.—Truman W. Pepper, Louis Planer and Joseph Kayser, of New York City:

We claim, first, The arrangement of devices, as above described, for effecting a longitudinal feed motion, in combination with the narrow sewing table, A, for the purpose herein stated.

Second, The arrangement and combination of the compound levers, C and E, with the springs, R and P, and the cam, G, and studs, i i, for the purpose of producing a feed for sewing machines.

Third, The employment of the lever, J, in combination with the cam, G, and studs, i i, and the levers, E and C, for regulating and changing or reversing and stopping the feed motion of sewing machines.

Fourth, The arrangement of the standard, L, with the lever, E, and cam, G, to regulate the vertical throw of the feed lever, C, as herein described.

45,629.—Circular Loom for Weaving the Covering of Cords, etc.—Isaac E. Palmer, Middletown, Conn.:

I claim, first, The employment for carrying the weft yarn, in a machine for weaving the covering of shade cord, or other circular or tabular fabric, of a gravitating shuttle, I, applied and operating substantially as herein specified within a rotating cylinder which carries the warp yarn.

Second, In combination with the rotating cylinder, E, having its axis horizontally arranged and carrying the warp bobbins, G G, and with the gravitating shuttle, I, I claim the transversing yarn guides or carriers, H H, having eyes, e e, provided in them, and applied and operating substantially as and for the purpose herein described.

Third, In combination with the said rotating cylinder, E, and the traversing yarn guides or carriers, H H, I claim the stationary cylinder, F, arranged at one end of the said rotating cylinder, and having two crossing grooves, p p', in its outer periphery, and the switch pieces, n n, or their equivalents attached to the said guides, the whole operating substantially as and for the purpose herein set forth.

Fourth, The hook, J, combined with the gravitating shuttle, substantially as and for the purpose herein specified.

Fifth, I claim the elastic yarn guides, V V, forming double springs and serving the purpose of guiding the warp yarns from the bobbins to the traversing guides or carriers, that of producing friction upon

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the bobbins and that of taking up any slack of the yarn, substantially as herein described.

45,630—Combined Ash Sifter and Shovel.—John H. Porter, New York City:

I claim a combined screen and fire shovel constructed or cast with a bottom having a screw. C, and solid shovel part, D, in different planes, substantially as shown and described.

[This invention consists in combining a screen with a fire shovel in such a manner that the device may be used either in the capacity of a screen or a shovel, and answer equally as good a purpose as articles made separately for each.]

45,631.—Apparatus for the Manufacture of super-phosphate of Lime.—Robert B. Potts & Frederick Kletts, Camden, N. J.:

We claim the use in the manufacture of superphosphate of lime of an agitator, a b and tank, d, substantially as herein shown and described and capable of being driven by power, as set forth.

[This invention consists in an apparatus which is driven by a steam engine or other source of power, and which serves to agitate and slice up the bone ash while the sulphuric acid is being added, and thereby the sulphate of lime is prevented from combining into compact lumps, and the bone-ash is readily and easily transformed into superphosphate.]

45,632.—Lightning-rod.—James Pratt, Chicago, Ill.:

I claim enclosing the cord of continuous, twisted wires, with a continuous copper strip arranged and operating substantially as and for the purpose herein shown and described.

45,633.—Meat-masher.—George W. Putnam, Peterboro (town of Smithfield), N. Y.:

I claim the use of a reciprocating or rolling lever, C C*, with flat or rough beating surfaces to operate in combination with the table, B, or its equivalent, substantially in the manner and for the purpose herein shown and described.

[This invention consists in a reciprocating bruising lever connected to a vertically adjustable swivel standard, and provided with a toothed or rough surface plate of iron or other suitable material to operate in combination with a suitable block of wood or other material provided with or without a rough surface, in such a manner that a piece of meat placed on said block of wood can be thoroughly pounded by the action of the lever and its fibers broken or bruised to render the same tender previous to cooking.]

45,634.—Hay-elevating Fork.—Edmond Reynolds, Corunna, Mich.:

I claim the combination and arrangement of the braced tines, A, and the catch, G, with the block, B, the arm, E, and the small lever, D, substantially as and for the purpose set forth.

45,635.—Store Dexters.—Edmond Reynolds, Corunna, Mich.:

I claim the store dexters or implement for culinary and other uses above described, constructed substantially as above described.

45,636.—Rotary Engine.—Alexander K. Rider, Hyderille, Vt.:

I claim, first, A rotary engine composed of a cylinder of hemispherical form, a rotating spheri-conical abutment, a rotating and oscillating piston, and a rotating shaft, the whole combined to operate substantially as and for the purposes herein described.

Second, The attachment of the rotating and oscillating piston, D, to the main shaft by means of the pin, e, inserted into a groove in the straight edge of the piston and passing through the shaft, substantially as herein specified.

Third, The T-shaped piston packing, c, applied in combination with the pin, e, which attaches the piston to the main shaft and with the inside of the cylinder head, substantially as and for the purpose herein specified.

45,637.—Rotary Engine.—Alexander K. Ryder, Hydeville, Vt.:

I claim, rst, A rotary engine composed of a spherical or hemispherical cylinder, a rotating obliquely cranked shaft, a rotary piston or piston of sober-conical form and an oscillating abutment, the whole combined to operate substantially as herein specified.

Second, The combination of the spherical collar, F, to which the abutment is attached, and the partition, B, or cylinder head formed of two plates, l m, substantially as and for the purpose herein specified.

45,638.—Magazine or Self-loading Fire-arm.—Robert Roberts, Utica, N. Y.:

I claim, first, The lever. K, constructed and operating as described to prevent the premature exit of the cartridges from the magazine and elevate them successively to the level of the bore.

Second, In combination with a suitable lifting device, I claim the posts or ways, m m, employed to guide the cartridges in their upper motion and retract the exploded shell, substantially as described.

[In this fire-arm the cartridges are passed one at a time from a cylinder or magazine containing a large number and raised successively in line with the barrel from which they are fired. While one device is raising a cartridge to be fired another contrivance ejects the shell of the exploded cartridge.]

45,639.—Eccentric Cage.—T. E. Rollins, Corning, N. Y.:

I claim the application of slots, c, in the sides of the cage, G, to operate in combination with the shaft, C, and eccentric disk, E, in the manner and for the purpose substantially as set forth.

[This invention consists in the application of two guide slots in sides of an eccentric cage to operate in combination with the shaft or stem to which the eccentric is attached in such a manner that by means of the slots the cage is held in line and prevented from being forced on one side by the action of the eccentric, and the shank or rod to which said cage is attached is preserved against being bent or made to bind in its bearings.]

45,640.—Curry-comb.—Cyrus W. Saladee, Putnam, Ohio:

I claim, first, The metallic handles, A1 A1, or their equivalents secured to the sides or ends of the curry-comb on a parallel line with the teeth of the same, in the manner and for the purpose substantially as shown and described.

Second, I claim the frame or plate, A, rivets, B B B B, studs, D D D D, Fig 1, plate, l, projections, x x x x, Fig. 3, in combination with the adjustable handles, A1 A1, in the manner and for the purpose substantially as shown and described.

45,641.—Expanding Tompion for Fire-arms.—Thomas K. Schermerhorn & Joseph Anderson, Brooklyn, N. Y. Ante-dated Dec. 17, 1864:

We claim the stationary nut, g, in combination with the expander B, sectional plug, A, elastic bands, d, and flange, D, constructed and operating as and for the purpose shown and described.

45,642.—Harvester.—Jacob Seibel, Manlius, Ill.:

I claim, first, The combination of the shaft, D, provided with the arms, i k, the rod, l, chain, l', and spring, n, all arranged and operating substantially as and for the purposes specified and shown.

Second, I claim the arrangement in combination with the above of the frame carrying the endless apron, E, and auxiliary belt, G, substantially as and for the purposes herein set forth and shown.

45,643.—Truck for Transporting Casks.—M. L. Senderling, Jersey City, N. J.:

I claim the bent or cranked axle, C, runners, D D, and windlass, E, in combination with each other and with the frame, A, open at its rear end, substantially as herein specified.

45,644.—Valve Arrangement for Pumps.—Wm. Sewell & Adam S. Cameron, New York City:

We claim the combination of the two valves, F and E, constructed and arranged in relation with each other and with the openings of the valve chamber, to operate in the manner substantially as and for the purpose herein set forth.

[On steamships, floating docks, and in similar situations, where steam and other pumps are employed, it is customary to furnish the latter with two sets of feed-pipes, one set connecting the pump with the sea and the other set connecting the pump with the bilge water which requires to be removed from time to time. This invention relates to an improved arrangement of valves for this purpose.]

45,645.—Device for Working Jib-sails.—John W. Sharrett, Portsmouth, Va.:

I claim, first, The application of the jib-sheet to the mast, B, substantially in the manner and for the purpose described.

Second, The use of catches, h h, or equivalent devices applied at or near the ends of the traveler bar, A, substantially in the manner and for the purposes described.

45,646.—Sleeve Button or Fastener.—Samuel J. Shaw, Marlboro', Mass.:

I claim the said improved sleeve fastener, made in manner and so as to operate substantially as described.

45,647.—Pump.—Wm. Shoup, Saltsburg, Pa. Ante-dated April 26, 1862:

I claim the combination of the pump tube, A, and concentric tube, C, the latter provided with the gate, D, and seed or packing bag, F, all arranged substantially as and for the purpose set forth.

45,648.—Photographic Glass-rack.—Willison G. Smith, Carlisle, Pa.:

I claim constructing the grooves on the shelves of photographic racks, substantially as above described.

[This invention consists in making a photographic rack for holding negatives and other plates for drying, etc., the grooves of which are made by nailing corrugated plates on the inside faces of the rack.]

45,649.—Anchor Tripper.—Wm. Stacey, Kittery, Maine:

I claim the combination of the tripping line, E, with the hook, D, the block, A, the davit or cat-head, B, and the rope, C, arranged together substantially as specified.

I also claim the combination of the belaying pin, G, or its equivalent, and the guide, F, with the davit or cat-head, B, the rope, C, the block, A, the hook, D, and the tripping line, F, the whole being arranged so as to operate together substantially in manner and for the purpose set forth.

45,650.—Rest for Grindstones.—Frank M. Stearns, Berea, Ohio:

I claim the curved iron rod with its cross head, A, substantially as described in combination with the clutch, C, nut, D, spring, E, and frame, B, as and for the purpose set forth.

45,651.—Manufacture of Shot.—Samuel Stevenson, Oil City, Pa.:

I claim the mode of manufacturing shot, by throwing the molten lead into the air by means of a forcing pump, sufficiently high or distant to secure their spherical form when lodged in the basin adapted for their reception, as set forth and specified.

45,652.—Exercising Machine.—Charles F. Taylor, New York City:

I claim the employment or use of oscillating platforms, one or more, provided with adjustable weights, and arranged to operate in the manner substantially as and for the purpose herein set forth.

I also claim in connection with the oscillating platforms, the adjustable bars, H, for retaining the platforms in a horizontal position when required.

I further claim the slides, K, when used in combination with the oscillating platforms, C, substantially as and for the purpose set forth.

45,653.—Truss.—G. W. Taylor & A. E. Wright, Philadelphia, Pa.:

We claim, first, The staple, C, applied in combination with the cross-bar, b, back braces, B, and body spring, A, in the manner and for the purpose substantially as herein shown and described.

Second, The spring, g, and friction plate, E, applied in combination with the front pad, D, and body spring, A, in the manner and for the purpose substantially as set forth.

45,654.—Grain Separator.—Walter Todd, Ottawa, Ill.:

I claim the rotating perforated screen, B, provided with the plates, C, in combination with the wire or other screen, D, all arranged substantially as and for the purpose herein set forth.

[This invention relates to a new and useful improvement on a grain separater for separating oats and foreign substances or impurities from wheat.]

45,655.—Drum Gas Heater.—Wm. H. Towers, New York City:

I claim the application and arrangements of the drum and cylinders to the common gas burner or any gas burner, applied and arranged as above described.

45,656.—Heater.—John C. Underwood, Richmond, Ind. Ante-dated Dec. 3, 1862:

I claim, first, The plate, J, and plate, K, in combination with the flange, s, and holes, x x x x x x x, substantially as described.

Second, I claim the air-chamber, H, and smoke pipe, F, in combination with the air conveyor, G, all arranged, constructed and operated substantially as described.

Third, I also claim the air chambers or passages, B8 and B9, in combination with the conveyor, G, all being arranged, constructed, and operated substantially as described.

Fourth, I also claim the air-chamber or space, B4, in connection with the space, B10, and chamber, B3, all in combination with the holes, A1 A1 A1 A1 A1 and A2 A2 A2 A2 A2, all being arranged, constructed, and operated substantially as above described.

45,657.—Beehive.—J. T. Vanduzer, Tyrone, N. Y.:

I claim the combination of the converging guides, K, the diaphgram, H, with its openings, I, the wire gauze bottom, G, and the door, J, constructed substantially as above described.

[The object of this invention is to entrap any vermin which enters the openings of the hive, to provide perfect ventilation, and to enable one to withdraw the honey with ease and without deranging any part of the hive in the operation.]

45,658.—Wheelbarrow.—James J. Van Kerson, Kalamazoo, Mich.:

I claim the combined arrangement of the revolving box and folding head frame, substantially as and for the purposes herein set forth.

45,659.—Hand-shear.—John N. Wallis, Fleming, N. Y.:

I claim the friction pulleys, O and P, working against the levers, C and D, in combination with the slots, I and J, or their equivalents as set forth.

45,660.—Breech-loading Fire-arm.—James Warner, Springfield, Mass. Ante-dated Dec. 14, 1864:

I claim the bevelled grooves, l and m, in the barrel and frame, in combination with the sliding pin, F, substantially as and for the purpose herein specified.

45,661.—Machine for making Horse-shoes.—Thomas J. West, Alfred, N. Y.:

I claim, first, The adjustable curved bed and pressure roller, operating substantially in the manner and for the purpose herein set forth.

Second, I claim the creasing apparatus constructed and operating substantially as described.

45,662.—Supporter for Artificial Leg.—James W. Weston, New York City:

I claim the rest, a, connected to and combined with the artificial leg by means of the strap, e, passed up and down through rings or eyes on the respective parts so as to support the leg and produce a self-adjustment, as specified.

45,663.—Valve Gear for Steam Engines.—A. H. Woodruff, Lansing, Iowa:

I claim the attachment of the valves operating rockshaft and valves to a movable column, I, by which they may be raised or lowered or otherwise moved in such a manner as to effect the induction at one or other edge of the valves, substantially as and for the purposes herein specified.

[This invention consists in a novel construction and arrangement of the valves and ports by and through which the induction and eduction of steam to and from the cylinder of an engine are effected, and a novel mode of operating the valves whereby the valves are worked for running the engine in either direction with one eccentric, and the stopping, starting, and reversing of the engine can be effected by means of one lever.]

45,664.—Shovel Plow.—S. H. Wooldridge, Venice, Ill.:

I claim, first, The construction of the forward standard, E, with a supporting lip or shoulder, b, formed on its forward edge, substantially as and for the purposes described.

Second, The combination of the standard, E, having a lip, b, formed on it, shovel, D, having a bar, D2, formed on it, and rear standard, F, with a plow beam, A, all arranged substantially as described.

45,665.—Balloon.—A. G. Wright, Santa Cruz, Cal. Ante-dated Dec. 24, 1864:

I claim attaching the lower edge of the casing of the balloon, A, directly to the upper edge of the boat-shaped car, B, substantially in the manner and for the purpose set forth.

45,666.—Cartridge for Ordnance.—Theodore Yates, Milwaukie, Wis.:

First, I claim the fulminate tube, E, employed for igniting the charge at or near the front end of the cartridge and operating in connection with the rod, C, disks, c c', and wire, e, substantially in the manner explained.

Second, I claim the disk, C', held within a corresponding seat or cavity in the forward end of the cylinder, D, by the action of the spring, C'', and adapted to be pressed to its seat by the gases generated by the charge, as stated.

[In this invention simple and unfailing means are provided for igniting the powder in a cannon cartridge, and preventing the escape of the gases generated by the explosion of the charge.]

45,667.—Steam Pan for Evaporators.—T. C. Bartle and C. F. Putney, Independence, Iowa, assignor to T.C Bartle:

We claim the employment of a series of steam pans, C C C, provided with the slides, E E', for closing the spaces, D D', in combination with the evaporating pan, B, arranged and operating substantially as and for the purposes herein shown and described.

45,668.—Drop Plate for Casting Solder.—James Cartwright, South Reading. Mass., assignor to himself and H. C. Sweetser, Boston, Mass.:

I claim the employment or use of the drop plate, A, provided with mold holes, b, and air channels, c, in the manner and for the purpose, substantially as herein shown and described.

[This invention consists in a plate provided with a series of cavities corresponding in size and shape to the drops to be cast, and suspended from suitable bails or handles in combination with legs and air channels passing through the plate between the cavities, in such a manner that by dipping said plate into a kettle containing molten metal all the cavities are filled, and when taken out of said kettle and placed on one side, the air has free access to all parts of the plate and the drops in the cavities will cool rapidly, thus allowing the plate to be used over and over again in rapid succession; it consists also in producing soldering drops by casting them in suitable molds in contradistinction to the ordinary way of cutting them from the bars, and thereby saving a considerable amount of metal.]

45,669.—Edge Plane.—James H. Conklin, Yorktown, N. Y., assignor to George P. Marshall, Peekskill, N. Y. Ante-dated Dec. 1, 1863:

I claim, first, The combination of the grooved lips, D D, immediately beneath the surface of C, substantially as set forth.

Second, The combination of the knife, E, and the screw, F, with the grooved lips, D D, substantially as set forth.

45,670.—Apparatus for Extracting Gold from Foreign Matters.—A. W. Hall (assignor to the Hall Mining Machinery Company), New York City:

I claim an apparatus for separating gold from foreign substances composed of a series of bent pipes or tubes, A A' A'' A''', combined by means of a series of connecting basins, B B' B'', containing quicksilver, substantially as herein specified.

45,671.—Operating Cultivator Teeth.—Thomas W. Hammon (assignor to himself and J. H. Lincoln), Montfort, Wis.:

I claim the employment or use, in cultivators and grain drills, of two parallel shafts, B B, connected by toothed segments, C C, or their equivalents, and having the arms or standards, D, of the teeth, E, attached to them, to operate in the manner substantially as and for the purpose herein set forth.

[This invention consists in having the standards or arms of the teeth attached to two separate shafts which are connected by toothed segments, arranged in such a manner that when the teeth of one shaft is raised those of the other shaft will be depressed or lowered, the toothed segments serving as equalizers to insure a proper action of the teeth in the soil.]

45,672.—Ventilator.—Peter Lear, Medford, Mass., assignor to himself and Samuel A. Bradley, Dorchester, Mass.:

I claim the said improved ventilator, constructed substantially in manner and so as to operate as described.

45,673.—Varnishing Machine.—Levi L. Martin (assignor to himself and Horace Thayer), Warsaw, N. Y.:

First, I claim the within-described machine adapted to varnish or paint rigid articles on one or more faces by means of one or more elastic rollers and suitable supplying means arranged relatively to each other and to the moving article, being operated on so as to apply and press the varnish or its equivalent on one or more faces of the articles passed through, substantially in the manner herein set forth.

Second, I claim, in such machine, mounting the roll, C, and its supplying apparatus on a movable part, a, moving relatively to fixed part, A, so as to adapt the machine to varnish articles of different thicknesses, substantially as herein specified.

Third, I claim in such machine the within-described arrangement of a roll, a tank and a scraper, so as to take up and apply the varnish by a single operation in proper quantities, as herein set forth.

45,674.—Skate.—Edgar Murray, New York City, assignor to Chas. W. Dunlap, Brooklyn, N. Y.:

I claim, first, The combination of the heel clamp, l, adjustable bar, k, and lever, g, whereby the heel clamp, l, is actuated by the toggle joint, formed between f h and o, substantially as specified.

Second, I claim the toggle joint, k, and lever, g, in combination with the plate, e, and clamps, d, for grasping the edges of the sole of the boot or shoe, as set forth.

Third, I claim the pin, q, forming a fulcrum for the toggle joint lever, g, in drawing back the plate, e, and releasing the clamp, d, as set forth.

45,675.—Pianoforte Action.—George Pratt, West Roxbury, Mass., assignor to Chickering & Sons, Boston, Mass.:

I claim a jack with a projection on the back for the regulating screw to act on, and another projection on the front, which is acted on by a straight, curved or elliptic wire spring, one end of which is inserted in a slot in said projection, the other end of the spring being inserted into and moving with the key; the jack thus operated upon by the spring and by the regulating screw, and thus constructed, acting immediately upon and behind the butt of the flange, substantially as and for the purpose herein specified.

Second, Making the rest rail and regulating rail separate and with a space between them when both these rails are behind the jacks, substantially as and for the purpose herein specified.

[This invention consists in an improved construction of the jack of a pianoforte action whereby the peculiar advantages of what are known as the French and the Pleyel actions are combined. It also consists in the construction of what are known as the rest rail and the regulating rail of separate parts and arranging them at some distance apart, whereby greater convenience is afforded for regulat-

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ing the jacks without the detachment of the key from the action, as is necessary when the two are attached and arranged behind the jacks.]

45,676.—Grain Thrashing and Separating Machines.—Joseph Raynor (assignor to himself and John R. Moffit, Harvey Clark and H. Tamplin), Piqua, Ohio:

I claim the combination of the spout, l, fan, s, tube, O, and conductor, P, constructed and arranged as specified, and operating in connection with the shaking shoe and thrashing cylinder, substantially as and for the purpose set forth.

45,677.—Mode of Adjusting Circular Saws on their Arbors.—C. B. Rogers (assignor to C. B. Rogers & Co.), Norwich, Conn. :

I claim, first, The combination of the key tenon and slot, g g', with the four collars, c c' d d', saw, b, arbor, a, and nut, e, substantially in the manner and for the purpose described.

Second, Producing the desired changes in the degree of obliquity of the saw and at the same time registering and indicating the change, in the manner and by means substantially as described.

45,678.—Portable Forge.—Samuel Rohrer, Palmyra, Mo., assignor to himself and W. W. Granger, Lewis Co., Mo.:

I claim the case or box, A, adjustable fire box, D, detachable smoke stack, L M, and bellows, C, all combined and arranged substantially as and for the purpose set forth.

I also claim the plates, H H, attached to the fire box, D, and arranged with the projections, k k, at the sides of the box, A, to hold up the fire box, substantially as described.

I also claim the plate, G, when hinged to the fire box, D, and used in connection with the smoke stack, L M, substantially as and for the purpose specified.

I also claim the hinged bottom, b, when applied to the box, A, provided with the bellows, C, substantially as and for the purpose set forth.

45,679.—Machine for Sand-papering Pencils.—Phillip Schrag (assignor to Eberhard Faber), New York City :

I claim, first, The employment or use of one or more slotted racks, substantially such as herein described, to operate in combination with a revolving polishing disk, in the manner and for the purpose substantially as set forth.

Second, Imparting to the slotted racks an automatic reciprocating motion, substantially as and for the purpose described.

45,680.—Low Water Signal for Steam Boiler.—Thomas Shaw, Philadelphia, Pa., assignor to Philip S. Justice :

I claim the employment of the metallic rod, in combination with a wood bearing, when arranged to operate substantially as and for the purpose set forth.

45,681.—Paper Collar.—Charles Spofford and Valentine Fogerty (assignor to themselves and W. S. Bell), Boston, Mass.:

We claim converting the ends of a paper collar into an imitation neck tie, substantially as described.

45,682.—Shuttle for Looms.—William Tunstill (assignor to Theodore H. Conkling), New York City :

I claim the employment or use of the case, B, in combination with a shuttle, A, constructed, applied and operating substantially as and for the purpose set forth.

[This invention consists in the employment of a case made sheet-metal or other suitable material, just large enough to rec a cup of suitable form and size, and secured in a shuttle in place of the ordinary quill, in such a manner that the weft thread is perfectly protected, and the liability of such thread becoming entangled is materially reduced.]

45,683.—Thrashing Machine.—George Westinghouse, Schenectady, N. Y., and Lorenzo Smith, of Sharon Springs, N. Y., assignors to George Westinghouse, aforesaid :

We claim, first, The rotary feeder, L, in combination with the riddle, F, and shaker, J, arranged and operating substantially as and for the purpose set forth.

Second, The grain receptacle or grain carrier, M, hung or suspended, as shown and described, in combination with the riddle, F, and thrashing cylinder, B, concave, C, and screw, D, all constructed and arranged to operate in the manner as and for the purpose specified.

Third, Encompassing the wooden shaft, d, of the shaker, J, with metal bands or ferrules, g, as and for the purpose set forth.

45,684.—Manufacture and Purification of Magnesium.—Edward Sonstadt, Loughborough, Eng. Patented in England May 21, 1863 :

I claim the manufacture of the metal magnesium by acting by means of sodium on a material obtained by evaporating to dryness and then heating to redness a mixture, in solution, of chloride of magnesium with chloride of potassium, substantially as described.

I also claim the distillation of metallic magnesium by means of an apparatus made of iron, from which atmospheric air is excluded during the distilling process, such apparatus consisting of a receiver placed immediately beneath the fire bars of the furnace which heats the vessel containing the crude metal, so that the receiver may, when required, be heated sufficiently to keep the magnesium which distils over in a fused or liquid state, and so that the pipe connecting the two vessels may be kept sufficiently hot to prevent the condensation of magnesium in it, substantially as herein described.

RE-ISSUES.

1,840.—Tobacco Pipe.—Charles Houghton, Trustee, Roxbury, Mass., assignee of Philip C. Rowe, Boston, Mass. Patented July 12, 1864 :

What is claimed is a smoking pipe having its parts constructed and arranged in the manner and for the purpose substantially as described.

1,841.—Boots and Shoes.—The McKay Turned Shoe Company, Massachusetts, assignees by Mesne Assignments of L. H. and B. S. Holden, Woburn, Mass. Patented April 2, 1861 :

What is claimed as the invention is so preparing the sole and upper for sewing that the parts thereof to be sewed together are brought to the condition substantially as shown and described, that is to say, projecting from or beyond the sole at right angles, or nearly so, to the general surface thereof, in such manner as to bring both faces of the seam on the outside of the work while the sewing is being performed.

1,842.—Boots and Shoes.—The McKay Turned Shoe Company, of Massachusetts, assignees by Mesne Assignments of L. H. and B. S. Holden, Woburn, Mass. Patented April 2, 1861 :

Claims a boot or shoe having the construction substantially as specified

1,843.—Cupola and other Furnaces.—Addison Smith and James M. Sayre, New York City, assignees by Mesne Assignments of Philip W. Mackenzie, Jersey City, N. J. Patented May 25. 1857. Re-issued Feb. 10, 1863 :

We claim, first, a furnace of elongated form and having its surrounding shell concave on the sides, substantially as described for the purpose set forth.

Second, We claim introducing the blast in cupola or blast furnaces in a thin sheet or sheets, substantially as described, in contradistinction to a series of round jets, whereby the blast is caused to act more uniformly in the charge.

Third, We claim a furnace having the plan of its bosh of a shape substantially like that shown, and provided with a means for the introduction of the blast all along both sides whereby the mass of fuel and metal is presented in thin vertical strata to the action of two continuous sheets of blast entering at the opposite sides of the furnace, substantially as and for the purpose set forth hereinbefore.

Fourth, We claim projecting the inner edge of the bosh (or the inner lower portion of the furnace chamber) inwardly beyond the tuyere or blast opening, or tuyere mouths, substantially as described.

PATENTS

GRANTED

FOR SEVENTEEN YEARS.

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter.

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are mad through the Branch Office of Messrs. MUNN & CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No 37 Park Row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre-paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row, New York

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

The Patent Laws, enacted by Congress on the 2d of March, 1861, now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their invention by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject giving a brief history of the case, inclosing the official letters, &c.

FOREIGN PATTENS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They think they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort at extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting, or writing to, MUNN & CO., No. 37 Park Row, New York.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid) should be addressed to MUNN & CO. No. 37 Park Row, New York.

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Notes and Queries

E. H. C., of Pa.—William the Conqueror introduced what is called Troy weight into England from Troyes, a town in France. The English were dissatisfied with this weight, because the pound did not weigh so much as the one in use at that time in England. The avoirdupois was adopted as a medium between the French and ancient English weights. The term stone, as applied to weight, is 14 pounds.

T. D., of N. Y.—In estimating the number of persons that stand at a meeting, a fair approximation may be reached by allowing that not over five average persons, men and boys, can stand in a square yard; ten square yards give 500 men at the closest calculation. This will be a safe rule for you to adopt in settling the dispute.

R. A., of Ill.—The speed of pulleys is just in proportion to their diameters. A two inch pulley driven by a four inch pulley will have double the speed of the driver. You say, suppose we have a main pulley 40 inches in diameter running at 120 revolutions per minute and a ten or twenty inch pulley on a countershaft, what size pulley do we require on a machine to run 600 per minute? If the 40-inch pulley drives the 20-inch, the speed of the latter will be 240 revolutions. The 10-inch pulley on the same shaft runs the same, therefore the pulley on the machine must run 2½ times faster than the 10-inch pulleys; a 4-inch pulley on the machine will run 600 per minute. To make the 8-inch pulley on the machine run 600 from a 30-inch pulley on the main shaft running 100, drive from the 30-inch on to a 15-inch pulley, which will make the counter-shaft run 200; on the same shaft key a 24-inch pulley, which will also run 200. The 8-inch pulley on your machine will run three times faster, or 600 per minute.

J. B. F., of Conn.—Iron pipes may be heated red hot or to any other temperature by steam. If the steam be saturated, the pressure will rise with the temperature, and this renders it impossible to heat ordinary steam pipes to a temperature that will ignite wood with saturated steam. But superheated steam may have any temperature at any pressure; at a furnace in this city it is used constantly at a red heat.

P. B., Jr., of Maine.—We do not like series of articles. The most common difficulty with correspondents is their want of faculty to condense their communications. If we could have one article on wire suspension bridges that would give the whole pith of the subject in one or two columns, it would be acceptable.

J. F., of N. Y.—If you could superheat your steam by waste heat it might be economical, but superheated steam is less efficient for heating buildings than saturated steam. Each pound of steam at a given temperature contains the same quantity of heat, and at a given temperature the pipe contains fewer pounds of superheated than of saturated steam.

E. M. C., of R. I.—Theoretically, when a quantity of water is set in motion by the impact or friction of moving steam, the water and steam together should have the same *vis viva* as the steam alone, but, practically, there would doubtless be a loss of power in all cases.

M. H., of Pa.—Your boiler starts leaking from a sudden reduction of the temperature at the point in question. The ebullition is most violent at that point, and the feed water checks it which is doubtless the cause of the trouble. Try the feed at the back connection, or near the smoke box, and see if it does not cure the leaking.

H. R. W., of Wis.—If you can prove that you had publicly used the invention for more than two years prior to the date of B's application for a patent, the law would protect you in the continued use of the machine.

J. H., of R. I.—It would be worth $100 to make a full analysis of the match for lighting cigars that you send us. We think, however, that the black lump round the end of the stick is made of pulverized charcoal, with a little gum to hold it together, and a very little nitrate of potash to keep it burning. It is then covered with a thin layer of charcoal containing a larger proportion of saltpeter, and a little match composition is attached to the end to set on fire.

B. T. S., of Ill.—The problem is a very simple one. If a body, the specific gravity of which is a trifle greater than that of water, is placed on the surface of the ocean it will sink downward, but as water is slightly compressible, it is conceivable that the body may reach water of greater specific gravity than itself, when its descent would be arrested. But if the body were as compressible as water, its own specific gravity would also be increased, and it would continue to sink. Practically, it is doubtful whether any substance ever began to sink in the ocean, and was then stopped by reaching water of greater density than itself.

S. M., of Mich.—In converting iron into steel, a hundred weight of iron combines with from 8 to 28 ounces of carbon, the latter figure being the maximum dose for any useful purpose.

S. M. H., of Ohio.—To preserve bright steel from rusting, smear it over with hot melted mutton suet, and before it cools dust some powdered unslacked lime from a muslin bag over the hot suet.

W. H., of Pa.—Write to the "Sorgho Journal," at Chicago, Ill. In orthography we take Webster as our authority. As you were taught at school to spell tun, a weight, t-o-n, it seems to you a mark of ignorance to spell it t-u-n; but to a person educated to spell after Webster, the old method probably seems a like proof of ignorance.

C. Z., of Pa.—An engine of 8.531 inches piston area with ¾ths of an inch stroke, and 100 turns per minute with 25 pounds pressure, develops, in round numbers, one-twelfth of one horse-power.

McL., of Pa.—An ordinary upright tubular boiler will answer your purpose. Messrs. Clute Brothers, Schenectady, N. Y., will probably furnish you with plans for one suitable for your engines.

Money Received

At the Scientific American Office, on account of Patent Office business, from Wednesday, Dec. 21, 1864, to Wednesday. Dec. 28, 1864:—

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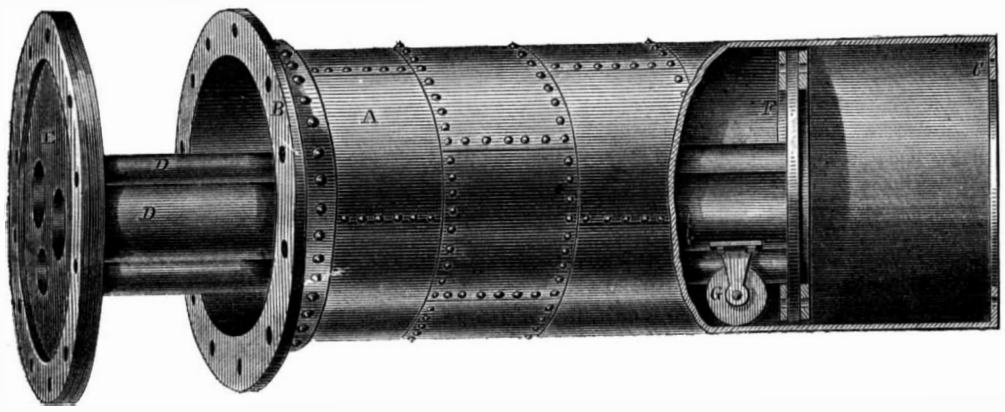
Improved Steam Boiler.

The object of constructing a boiler in the manner shown in the engraving is to enable the flues to be scaled easily and completely, and to repair such parts as are otherwise inaccessible, without taking the boiler to pieces. The method of constructing it is explained as follows by the inventor:—

The shell, A, is furnished with flanges, B and C, at each end. One of the flanges is placed in the interior and the other the exterior of the boiler; the flues, D D, are riveted in the usual way to the heads, E and F, which are made to fit the flanges. On removing the bolts which secure the heads to the flanges, the smaller head, F, may be drawn through the boiler, thus withdrawing the flues from the shell, as shown. The roller, G, placed on the flue, near the inside and smaller head, facilitates the passage through the shell. The engraving represents an ordinary cylindrical boiler, such as is commonly used on the western rivers, although these have but a pair of internal flues. It is often convenient, in the absence of any better method, to cut away sound portions of the boiler to enable the workmen to reach parts that it is necessary to repair. It is manifest that my invention may be applied with advantage to almost any of the systems of construction that have been hitherto adopted. This invention is patented.

For further information apply to A. Hitchcock-Nos. 4 and 6 Pine street, New York.



HITCHCOCK'S STEAM BOILER.

Improved Horse Rake.

There is no machine more important to farmers in general than the horse rake, and many a crop which would otherwise have been damaged, or destroyed by rain, has been secured in good time and condition by the employment of it.

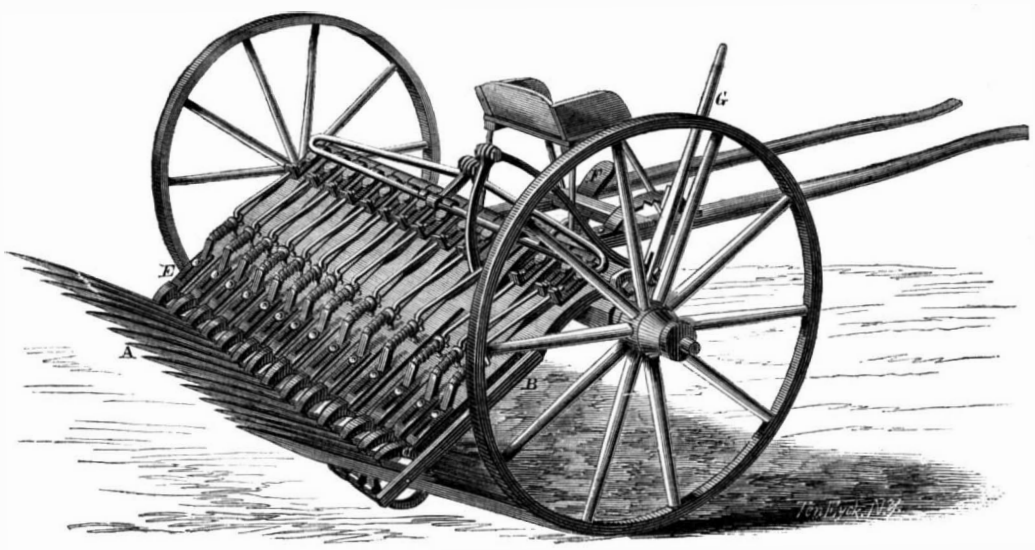
The machine here illustrated has some excellent features. It is light and strong, and so arranged that the teeth accommodate themselves to inequalities of surface; therefore the machine operates as well up hill as down, and will rake a knoll as clean as a plain. Appended is a description of the several parts.

The teeth, A, are fastened to the arms, B. These arms are hinged to the main axle so that they can rise and fall in going over rough ground, as heretofore explained. The teeth have double-shouldered cams, C, on them, which work between the hinged bars, and there are a series of spring stops, E, which slide on the hinged bars.

When the rake is in operation, the stops hold the teeth firmly, but when it is desired to detach the load they are all withdrawn at once by pressing the foot on the pedal, F; the teeth then roll over and leave an even windrow behind them. The teeth and bars can be elevated by the lever, G, so that in going from field to field they are not in contact with the ground.

These features render this machine a very efficient one, and it is easily worked by one man and a horse.

The invention was patented through the Scientific American Patent Agency, December 1st, 1863, by John Wallace and Daniel Carpenter; for further information address either party at Goshen, N. Y.



WALLACE AND CARPENTER'S HORSE RAKE

New System of Manufacturing Heavy Guns at Woolwich.

We understand that Mr. Frazer, manager of the Ordnance Department at Woolwich Gun Factory, has recently introduced a novel system of manufacture, from which the best results are expected. According to this system the breech end of the gun—that is to say, the breech and all that portion of the piece from the cascabal to a point a little in advance of the trunnions—is made in a single forging. To the end of it is welded one end of a coiled tube, which completes the length of the gun. Over the breech-piece is then shrunk a coiled ring, extending from the cascabal beyond the trunnions, so as to cover the weld already alluded to. The gun is completed by the addition of one coil more, reaching from the trunnions to the breech, and the insertion of a steel lining tube. The coils are each not far from a foot thick, we believe, and the advantages claimed are, first, that the entire gun consists of but five or six separate pieces, instead of double or treble the number. Second, that the gun is so strong that it is not very probable that it will suffer much injury if struck by a hostile shot; and, lastly, that an iron, costing but £12 per tun, is enabled to take the place of one costing £22 per tun The Armstrong 13-tun gun costs, we believe, about £1,800, while the expense of the Frazer gun will probably not exceed some £400 or £500 sterling.

What "Brocade" is.

Originally this term was applied only to those silk into which gold or silver threads, or a mixture o these, were interwoven. They were highly esteemed by our ancestors, but now their use has been discontinued. The richest brocades appear to have been made in Italy, where an extensive manufactory was carried on in the thirteenth century. In the manufacture of gold brocade a silver wire is gilt, drawn out to a great fineness, and flattened. This is twisted around a silk thread, dyed of a color as near as possible to the metal, and interwoven in the fabric. Latterly the term brocade has been applied to rich stuffs adorned with raised flowers, foliage, or other ornaments. The plan of introducing metals into the composition of fabrics was a taste originally Oriental, where a love of rich and splendid stuffs prevails so extremely. In China and India it has long been the fashion to ornament silk and muslin with threads of gold and silver.—*Technologist.*

TO

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